On the basis of our analysis of subsurface conditions and the proposed construction, the following foundation design recommendations are provided:

1.	Pile Section:	Timber, ASTM D25
2.	Species:	Southern Pine
3.	Preservative Treatment:	AWPA C3
4.	Maximum Driving Stress:	3,000 psi
5.	Maximum Design Capacity:	15 Tons/pile
6.	Maximum Effective Driving Energy:	18 Kip-Ft./blow (Single-acting hammer)
7.	Maximum Vertical Batter	1H:10V
8.	Minimum Pile Spacing	2.5 x pile diameter

Piles should be designed and installed according to *Standard Guidelines for the Design and Installation of Pile Foundations* (ASCE 20-96) published by ASCE. For the purposes of bidding, construction documents should require a base bid pile length equal to 35 feet, and unit prices should be provided to adjust for the final in-place pile length. The final pile tip depth should be determined in the field by using an acceptable driving formula or through dynamic pile load testing methods according to ASTM D 4945 (CASE) corresponding to the above allowable load capacity including a factor of safety equal to 2.0. Protective pile tips should be used to prevent damage due to driving through fill, obstructions, or into bedrock.

Floor Slabs

In Areas 1 and 2 of the Site, floor slabs may be constructed over a Base Course material consisting of crushed gravel conforming Maine Department of Transportation (MaineDOT) Specification Item 703.10 and the gradation requirements as follows:

Sieve Size	**Percent Passing by Weight**
2"	100
1"	95–100
¾"	90–100
No. 4	40–65
No. 10	10–45
No. 200	0–7.0

The Base Course should be at least 6 inches in thickness and compacted to 95 percent of the optimum density as determined by ASTM D 1557. Floor slabs may be designed following procedures recommended by the Portland Cement Association (PCA) or American Concrete Institute (ACI) using

300 pounds per cubic inch (pci) as the Westergaard modulus of subgrade reaction on top of the base course layer.

In Area 3 of the Site, due to anticipated long-term settlements we recommend that both the apartment floors and any garage floor be designed and constructed as elevated structural floors fully supported on foundation grade beams and timber piles as recommended above.

Pavements

With proper site preparation and drainage, the native subgrades should provide adequate strength to support the proposed traffic loading. Due to the potential for long term settlements rigid pavements are not recommended in Area 3. Additionally, bituminous wearing surfaces should not be applied until primary settlements beneath embankments have dissipated in Area 3. Pavements in entrances and drives should be designed according to the MaineDOT design procedures and utilizing the following soil parameters for flexible pavements:

Soil Subgrade Parameters:	
AASHTO Subgrade soils classification	A-1-b
ACE Frost Susceptibility Group	F2
CBR (SM)	20
Westergaard Subgrade Modulus, k	250 pci
Effective Resilient Modulus, M_R	4,500 psi

A recommended typical pavement section for truck lanes and entrances is provided in the following table and is based on estimated traffic criteria, subgrade design parameters, and American Association of State Highway and Transportation Officials (AASHTO) design guidelines for flexible pavements. A reduced typical pavement section for areas subject to passenger vehicles only is also provided.

Table 4: Recommended Flexible Pavement Sections

Truck Lanes and Entrances				
Layer	**Top**	**Binder**	**Base**	**Subbase**
Thickness (in.)	2	2	4	12
MaineDOT Spec.	703.09, Type 12.5 mm	703.09, Type 19 mm	703.09, Type 19 mm	703.06, Type B

Passenger Vehicles Only				
Layer	**Top**	**Binder**	**Base**	**Subbase**
Thickness (in.)	1.5	2.5	0	12
MaineDOT Spec.	703.09, Type 12.5 mm	703.09, Type 19 mm	703.09, Type 19 mm	703.06, Type B

Earth-Retaining Structures

Due to the depth of fill and cuts for the proposed site grades, construction of two retaining walls is required for the development. An approximately 800-foot long retaining wall is proposed for the eastern property boundary of the Site and a 60-foot long retaining wall is proposed to support soils at the embankment near the existing power plant on the Presumpscot River. As currently proposed, the 800-foot wall will range in height from approximately 12 to 3 feet and will support soils on the easterly abutting property. Based upon our subsurface investigations, portions of this wall will require bedrock cuts as great as 9 feet to achieve the required site grades.

Due to the close proximity of the power plant and Presumpscot River, it should be anticipated that the required retaining wall will require temporary sheeting and possibly underpinning of adjacent foundations during construction. Temporary cofferdams and dewatering systems should also be anticipated to build the retaining wall foundation in dry, stable conditions. Due to the height and assumed loading, we anticipate this wall will be designed as a reinforced-concrete cantilever wall supported on deep piles. However, additional subsurface exploration in the vicinity of the proposed wall and investigation of the adjacent foundations will be required to confirm these recommendations.

In general, foundation walls, loading docks, or earth-retaining structures should be designed to resist lateral pressures generated by soil backfill materials and any temporary or permanent surcharge loads. At-rest conditions should be assumed for the design of loading dock walls and other walls that are rigid and braced prior to backfilling. Walls that are free to deflect or rotate may be designed assuming active conditions.

The following parameters are based on Rankine's Lateral Earth Pressure Theory and may be utilized to compute the lateral earth pressures for rigid walls constructed with level backfill, whichever apply:

	Active	At-Rest
Coefficient of Lateral Earth Pressure (Level Backfill)	0.27	0.45
Equivalent Fluid Weight, pounds per cubic foot (pcf)	32	54

For sliding and overturning stability, the following design parameters are recommended:

Unit weight of granular backfill	120 pcf
Coefficient of sliding friction, μ	0.50
Maximum foundation edge pressure	4,000 psf

The backfill should be adequately drained to minimize hydrostatic pressures behind the wall. For this purpose, a foundation drain is recommended. The drain should consist of a nominal 4-inch-diameter perforated pipe installed behind the wall and at the foundation bearing grade level. The pipe should be embedded in at least 6 inches of clean gravel (less than 2% passing No. 200 sieve) material that is also placed directly behind the wall in a minimum 12-inch-wide trench. The clean gravel should be wrapped in a synthetic filter fabric such as Mirafi 140N or equal to prevent clogging. Additionally, an impervious cover should be placed at the ground surface to minimize infiltration of surface runoff.

Underground Utilities/Stormwater Infiltration Design

The subsurface native granular soils are considered to be slightly corrosive to gray or ductile cast-iron pipe. However, the existing fill soils may contain corrosive materials, and therefore, we recommend that utilities placed within the existing fill soils be adequately protected from corrosion. Utility trenches should be properly excavated and shored according to the recommendations provided above. Utility trenches should be backfilled according to the recommendations for fill and backfill provided below. Construction of utilities in Area 3 of the Site should be completed only after settlements due to fill have substantially dissipated.

Based on our understanding of project program requirements, the proposed stormwater collection system will not require subsurface infiltration, and therefore soil permeability design parameters are not required.

Fill and Backfill

The following materials and compaction effort are recommended for use in areas of fill and backfill:

Type	Size	% Passing	Compaction
Structural Fill MaineDOT Spec. 703.06, Type E	3" ¼" No. 40 No. 200	100 25–100 0–50 0–7.0	95% ASTM D 1557 8-inch lifts
Embankment Fill MaineDOT Spec. 703.20	6" ¼" No. 200	100 0–70 0–10	92% ASTM D 1557 8-inch lifts
General Fill	8"	100	90% ASTM D 1557 12-inch lifts

Due to the fine grain content of existing soils and oversized particles, the existing excavated material is considered unsuitable for Structural Fill. Imported Structural Fill should be placed beneath and adjacent to all structures and utilities. Embankment fill should be placed beneath pavements.

On-site soils and materials from site preparation and demolition operations, such as concrete, brick, masonry, or blasted rock may be crushed, reprocessed, or mixed with off-site soils to create suitable Embankment and General fill materials, provided that the resulting material satisfies requirements specified herein. General Fill should be used in landscaped areas only. All permanent slopes steeper than 3H:1V (18° from horizontal) should be protected with suitable erosion-control blankets. Any permanent slopes steeper than 2H:1V (27°) should be protected with stone rip-rap. Stone rip rap should conform with MaineDOT Specification 703.26 for Plain RipRap, consisting of either field stone or rough, unhewn quarry stone with at least 50 percent of the stone by volume exceeding fifty pounds in weight. In highly erodible environments such as river banks, the stone rip-rap should be designed according to U.S. Army Corps river bank protection design standards and placed over geotextile filtration fabric similar to Mirafi 140N. River banks should not exceed 2H:1V (27°) slopes. Permanent slopes in dry land and where seepage is not a concern should not be steeper than 1.5H:1V (34°). Grades should gently slope away

from building foundations and provide the minimum soil cover for protection of foundation subgrades from frost penetration.

A two-dimensional global slope stability analysis was performed for the Site from selected interpreted soil profiles that included proposed site grades and fills areas overlying the existing fill, organic, and clay subsoil layers. These analyses included both Bishop Modified and Ordinary Method of Slices calculations. Based on these calculations, the proposed embankments and fills have suitable factors of safety from rotational slope failure of the underlying clay and organic fills.

Construction Quality Control

The geotechnical engineer should be provided the opportunity to review the final design and specifications to ensure recommendations presented herein have been properly interpreted and applied. It is recommended that all backfill and compaction be inspected and tested by a qualified firm to ascertain that the proper materials are placed and adequately compacted. The geotechnical engineer should review all soil inspection and testing reports and monitor site development and foundation subgrade preparation to determine the necessity for additional cut and backfill beneath building subgrades. The geotechnical engineer should also review the contractor's subgrade settlement survey and monitoring program during the placement of fill and, on the basis of this survey, determine the time-rate of settlement and recommended sequence for installation of structures, utilities, and pavements in Area 3.

CLOSURE

This report has been prepared to assist the Site and structural engineers in the design and construction of foundations, pavements, and Site structures related to the proposed development at 7 to 13 Depot Street, South Windham, Maine. The recommendations have been presented on the basis of an understanding of the project as described herein, and through the application of generally accepted foundation engineering practices. No other warranties, expressed or implied, are made.

Mr. Lee D. Allen, P.E.
Northeast Civil Solutions

We have enjoyed working with you on this phase of your project. Further investigations recommended in this report may be provided upon your request and written authorization. Should you have any questions regarding this report or require additional assistance, please do not hesitate to call.

Sincerely,

OAK ENGINEERS, LLC.

Wendell A. Shedd, III
Senior Geotechnical Engineer

Paul D. DeStefano, Ph.D., P.E.
Director, Geotechnical and Structural Services

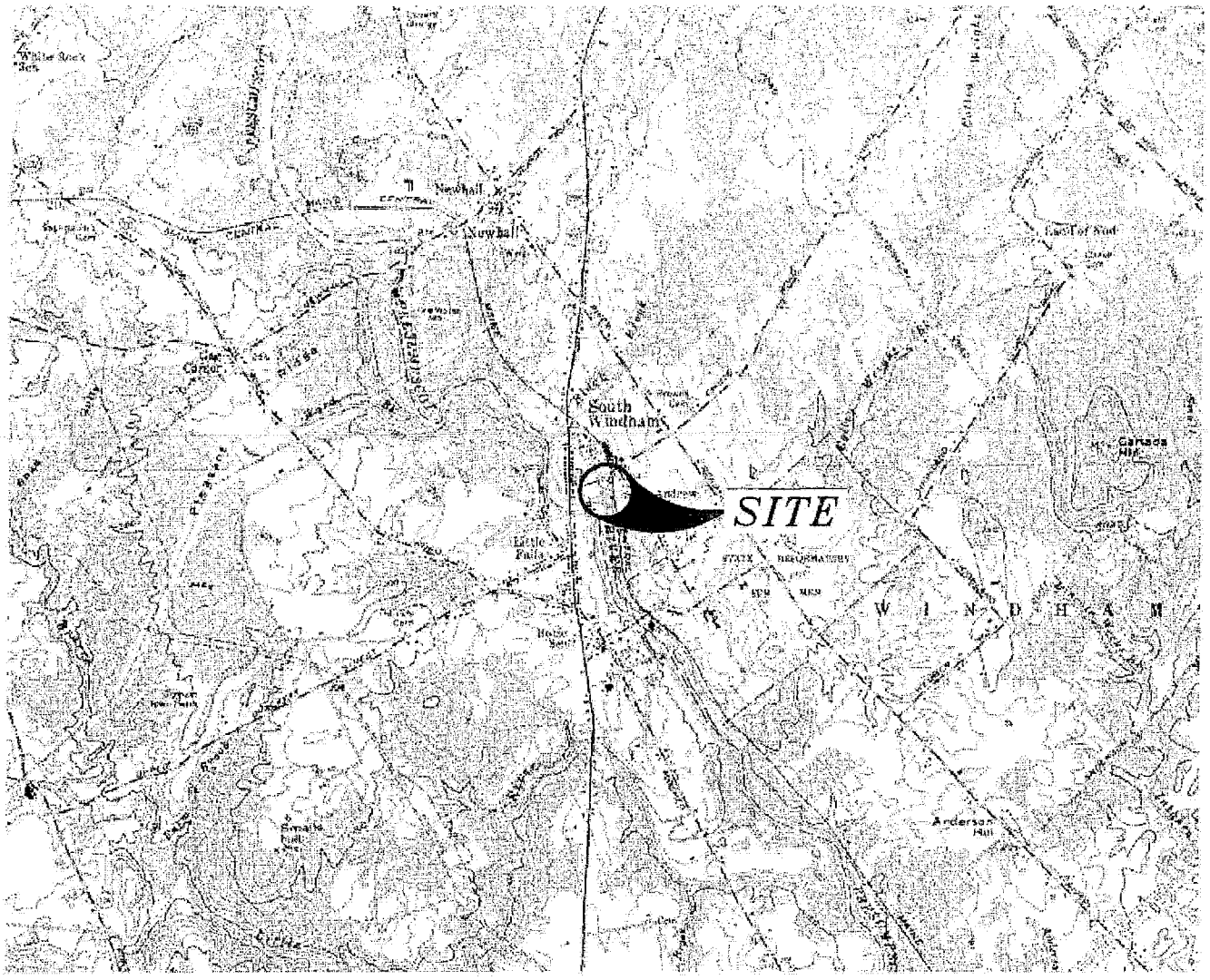
WAS/PDD:ss
Attachments

cc: Steve Etzel, Questor, Inc.

ATTACHMENT A

Figures

Geotechnical Investigation
Village at Little Falls, LLC
7 to 13 Depot Street
South Windham, Maine



TAKEN FROM U.S.G.S. 7.5x15 MINUTE SERIES TOPOGRAPHIC MAP OF GORHAM, MAINE–1957 (REVISED 1975).

CONTOUR INTERVAL IS 20 FEET

SITE COORDINATES: LATITUDE 43°44'06"
LONGITUDE 70°25'25"

UTM COORDINATES: 48: 43: 421mN
3: 85: 345mE

QUADRANGLE LOCATION

SCALE in FEET
1: 25,000

OAK ENGINEERS
Brown's Wharf
Newburyport, MA 01950
(978) 465-9877

PREPARED FOR:
NORTHAEAST CIVIL SOLUTIONS
153 U.S. ROUTE 1
SCARBOROUGH, MAINE

DATE: FEBRUARY 26, 2007
OJECT: 064006
FIGURE: 1

SITE:
VILLAGE AT LITTLE FALLS
13 DEPOT STREET
SOUTH WINDHAM, MAINE

C:\2006\064006\Drawings\064006-SLM.dwg

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ATTACHMENT B

Soil Boring and Test Pit Logs

Geotechnical Investigation
Village at Little Falls, LLC
7 to 13 Depot Street
South Windham, Maine

OAK ENGINEERS

BORING LOG: B101

Ground Elevation:	See Plan	Total Depth:	23 Feet	Logged By:	WAS
GW encountered:	Feet	Boring Diameter:	6 Inches	Date Drilled:	1/24/07 to 1/24/07
GW @ completion:	N.M. Feet	Well Stickup:	0	Driller:	Northern Test Boring

DEPTH	DESCRIPTION	REMARKS	SAMPLE	SAMPLE NUMBER	BLOW COUNTS (per 6 inches)	PENETRATION/ RECOVERY (in.)	USCS SYMBOL	N	WELL
	Black to Dark Brown f-c SAND, little Silt, trace Gravel	dry to moist		SS-1	8,3 3,3	24/12	SM	6	
	(loose)	moist		SS-2	2,3 3,3	24/16	SM	6	
5	Olive CLAY, some silt, trace fine Sand, slightly plastic to plastic	moist - PP = 2.5 tsf		SS-3	2,2 3,3	24/20	CL	4	
		moist - w = 27.2%		SS-4	4,3 3,5	24/24	CL	6	
		moist		SS-5	3,4 4,4	24/24	CL	8	
10		moist to wet		SS-6	4,4 5,5	24/24	CL	9	
15		wet		SS-7	3,3 3,3	24/24	CL	6	
20		wet		SS-8	4,8 12,18	24/24	CL	20	
	(stiff to medium)								
	Auger Refusal - End of Boring @ 23'								
25									
30									
35									

NOTES:
1. Drilling Method: Track mounted Diedrich D-50 with 2-1/4" i.d. Hollow Stem Auger (HSA)
2. Soil Sampling: 2-inch Split Spoon Sampler driven with 140 lb. hammer falling 30 inches (Auto-Hammer).

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SITE:
Village at Little Falls
7 to 13 Depot Street
South Windham, Maine

Project No.: 064006 | Page: 1

VIL_RESP03596

OAK ENGINEERS

BORING LOG: B102

Ground Elevation:	See Plan	Total Depth:	7.3 Feet	Logged By:	WAS
GW encountered:	N.O. Feet	Boring Diameter:	6 Inches	Date Drilled:	1/24/07 to 1/24/07
GW @ completion:	N.M. Feet	Well Stickup:	0	Driller:	Northern Test Boring

DEPTH	DESCRIPTION	REMARKS	SAMPLE	SAMPLE NUMBER	BLOW COUNTS (per 6 inches)	PENETRATION/ RECOVERY (in.)	USCS SYMBOL	N	WELL
	Gray to Brown f-c SAND, some Gravel, little Silt (loose)	dry to moist		SS-1	24,14 9,3	24/15	SM	23	
	Olive SILT, some Clay, trace fine Sand, slightly plastic to plastic	moist		SS-2	2,3 2,3	24/17	ML	5	
5		moist - w = 26.2%		SS-3	2,3 5,5	24/20	ML	8	
	(stiff to medium)	moist - weathered shale pieces in spoon		SS-4	5,10 50/3"	15/10	ML	>100	
	Auger and Split Spoon Refusal - End of Boring @ 7.3'								
10									
15									
20									
25									
30									
35									

NOTES:
1. Drilling Method: Track mounted Diedrich D-50 with 2-1/4" i.d. Hollow Stem Auger (HSA)
2. Soil Sampling: 2-inch Split Spoon Sampler driven with 140 lb. hammer falling 30 inches (Auto-Hammer).

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SITE:
Village at Little Falls
7 to 13 Depot Street
South Windham, Maine

Project No.: 064006 Page: 1

OAK ENGINEERS

BORING LOG: B103

Ground Elevation:	See Plan	Total Depth:	12.5 Feet	Logged By:	WAS
GW encountered:	11 Feet	Boring Diameter:	6 inches	Date Drilled:	1/24/07 to 1/24/07
GW @ completion:	N.M. Feet	Well Stickup:	0	Driller:	Northern Test Boring

DEPTH	DESCRIPTION	REMARKS	SAMPLE	SAMPLE NUMBER	BLOW COUNTS (per 6 inches)	PENETRATION/ RECOVERY (in.)	USCS SYMBOL	N	WELL
0	Topsoil Olive Brown SILT and fine SAND	dry to moist		SS-1	4,4 50/4"	16/6	SM-ML	>100	
		moist - kerosene odor		SS-2	4,7 15,17	24/7	SM-ML	22	
5	becoming Dark Brown to Black	moist - wood pieces		SS-3	4,5 6,9	24/8	SM-ML	11	
	becoming Olive Brown with trace fine Gravel (firm)	moist		SS-4	7,9 5,4	24/7	SM-ML	14	
	Light Brown f-m SAND and Gravel, little Silt	moist - coal pieces - w = 12.5%		SS-5	4,5 3,3	24/8	GM-SM	8	
10		wet		SS-6	2,2 3,1	24/12	GM-SM	5	
	(loose) Auger Refusal - End of Boring @ 12.5'								
15									
20									
25									
30									
35									

NOTES:
1. Drilling Method: Track mounted Diedrich D-50 with 2-1/4" i.d. Hollow Stem Auger (HSA)
2. Soil Sampling: 2-inch Split Spoon Sampler driven with 140 lb. hammer falling 30 inches (Auto-Hammer).

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SITE:
Village at Little Falls
7 to 13 Depot Street
South Windham, Maine

Project No.: 064006 Page: 1

OAK ENGINEERS

BORING LOG: B104

Ground Elevation:	See Plan	Total Depth:	9 Feet	Logged By:	WAS
GW encountered:	N.O. Feet	Boring Diameter:	6 Inches	Date Drilled:	1/24/07 to 1/24/07
GW @ completion:	N.M. Feet	Well Stickup:	0	Driller:	Northern Test Boring

DEPTH	DESCRIPTION	REMARKS	SAMPLE	SAMPLE NUMBER	BLOW COUNTS (per 6 inches)	PENETRATION/ RECOVERY (in.)	USCS SYMBOL	N	WELL
	Black f-m SAND, some Silt (loose)	dry to moist - brick and coal ash		SS-1	8,7 7,6 4,5	24/21	SM	14	
	Olive SILT and fine SAND, trace Gravel (firm) Auger Refusal on weathered rock	moist - shaley rock pieces in spoon		SS-2	18,50/ 4"	24/10	ML	23	
5		RQD = 68.3%		RC-1		60/60			
	End of Boring @ 9'								
10									
15									
20									
25									
30									
35									

NOTES:
1. Drilling Method: Track mounted Diedrich D-50 with 2-1/4" i.d. Hollow Stem Auger (HSA)
2. Soil Sampling: 2-inch Split Spoon Sampler driven with 140 lb. hammer falling 30 inches (Auto-Hammer).

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SITE:
Village at Little Falls
7 to 13 Depot Street
South Windham, Maine

VIL_RESP03599

Project No.: 064006 Page: 1

OAK ENGINEERS

BORING LOG: B105

Ground Elevation:	See Plan	Total Depth:	9 Feet	Logged By:	WAS
GW encountered:	N.O. Feet	Boring Diameter:	6 Inches	Date Drilled:	1/24/07 to 1/24/07
GW @ completion:	N.M. Feet	Well Stickup:	0	Driller:	Northern Test Boring

DEPTH	DESCRIPTION	REMARKS	SAMPLE	SAMPLE NUMBER	BLOW COUNTS (per 6 inches)	PENETRATION/ RECOVERY (in.)	USCS SYMBOL	N	WELL
	Dark Gray to Black f-m SAND, some Silt (loose)	dry to moist - brick pieces		SS-1	22,17 7,7	24/22	SM	24	
	Olive SILT, trace fine SAND, trace Gravel (firm) Auger Refusal on weathered rock	moist - w = 24.7%		SS-2	5,7 9, 50/3"	21/17	ML	16	
5		RQD = 73.3%		RC-1		60/60			
	End of Boring @ 9'								
10									
15									
20									
25									
30									
35									

NOTES:
1. Drilling Method: Track mounted Diedrich D-50 with 2-1/4" i.d. Hollow Stem Auger (HSA)
2. Soil Sampling: 2-inch Split Spoon Sampler driven with 140 lb. hammer falling 30 inches (Auto-Hammer).

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SITE:
Village at Little Falls
7 to 13 Depot Street
South Windham, Maine

Project No.: 064006 Page: 1

OAK ENGINEERS

BORING LOG: B106

Ground Elevation:	See Plan	Total Depth:	5.8 Feet	Logged By:	WAS
GW encountered:	N.O. Feet	Boring Diameter:	6 Inches	Date Drilled:	1/24/07 to 1/24/07
GW @ completion:	N.M. Feet	Well Stickup:	0	Driller:	Northern Test Boring

DEPTH	DESCRIPTION	REMARKS	SAMPLE	SAMPLE NUMBER	BLOW COUNTS (per 6 inches)	PENETRATION/ RECOVERY (in.)	USCS SYMBOL	N	WELL
	Dark Gray fine SAND, some Silt								
	Olive SILT, trace fine Sand, non- to slightly plastic	dry to moist - ash		SS-1	3,4 7,8	24/21	ML	11	
		moist		SS-2	3,5 7,9	24/20	ML	12	
5	(firm)	moist - rock pieces in sample		SS-3	9,11 14, 50/2"	20/20	ML	25	
	Auger and Split Spoon Refusal - End of Boring @ 5.8'								
10									
15									
20									
25									
30									
35									

NOTES:
1. Drilling Method: Track mounted Diedrich D-50 with 2-1/4" i.d. Hollow Stem Auger (HSA)
2. Soil Sampling: 2-inch Split Spoon Sampler driven with 140 lb. hammer falling 30 inches (Auto-Hammer).

CLIENT:
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SITE:
Village at Little Falls
7 to 13 Depot Street
South Windham, Maine

Project No.: 064006 | Page: 1

OAK ENGINEERS

BORING LOG: B107

Ground Elevation:	See Plan	Total Depth:	2.8 Feet	Logged By:	WAS
GW encountered:	N.O. Feet	Boring Diameter:	6 Inches	Date Drilled:	1/24/07 to 1/24/07
GW @ completion:	N.M. Feet	Well Stickup:	0	Driller:	Northern Test Boring

DEPTH	DESCRIPTION	REMARKS	SAMPLE	SAMPLE NUMBER	BLOW COUNTS (per 6 inches)	PENETRATION/ RECOVERY (in.)	USCS SYMBOL	N	WELL
	Olive SILT and fine SAND, trace fine Gravel	dry to moist		SS-1	9,7 12,14	24/22	ML	19	
	(firm)	moist		SS-2	12, 50/3"	9/7	ML	>100	
	Auger and Split Spoon Refusal - End of Boring @ 2.8'								
5									
10									
15									
20									
25									
30									
35									

NOTES:
1. Drilling Method: Track mounted Diedrich D-50 with 2-1/4" i.d. Hollow Stem Auger (HSA)
2. Soil Sampling: 2-inch Split Spoon Sampler driven with 140 lb. hammer falling 30 inches (Auto-Hammer).

CLIENT:
Northeast Civil Solutions

SITE:
Village at Little Falls
7 to 13 Depot Street
South Windham, Maine

Project No.: 064006 Page: 1

OAK ENGINEERS

BORING LOG: B108

Ground Elevation:	See Plan	Total Depth:	1.2 Feet	Logged By:	WAS
GW encountered:	N.O. Feet	Boring Diameter:	6 Inches	Date Drilled:	1/24/07 to 1/24/07
GW @ completion:	N.M. Feet	Well Stickup:	0	Driller:	Northern Test Boring

DEPTH	DESCRIPTION	REMARKS	SAMPLE	SAMPLE NUMBER	BLOW COUNTS (per 6 inches)	PENETRATION/ RECOVERY (in.)	USCS SYMBOL	N	WELL
0	Light Brown SILT and fine SAND	dry to moist - rock fragments		SS-1	3,7 50/2"	14/14	ML	>100	
	Auger and Split Spoon Refusal - End of Boring @ 1.2'								
5									
10									
15									
20									
25									
30									
35									

NOTES:
1. Drilling Method: Track mounted Diedrich D-50 with 2-1/4" i.d. Hollow Stem Auger (HSA)
2. Soil Sampling: 2-inch Split Spoon Sampler driven with 140 lb. hammer falling 30 inches (Auto-Hammer).

CLIENT:
Northeast Civil Solutions

SITE:
Village at Little Falls
7 to 13 Depot Street
South Windham, Maine

Project No.: 064006 Page: 1

OAK ENGINEERS

BORING LOG: B109

Ground Elevation:	See Plan	Total Depth:	7.5 Feet	Logged By:	WAS
GW encountered:	N.O. Feet	Boring Diameter:	6 Inches	Date Drilled:	1/24/07 to 1/24/07
GW @ completion:	N.M. Feet	Well Stickup:	0	Driller:	Northern Test Boring

DEPTH	DESCRIPTION	REMARKS	SAMPLE	SAMPLE NUMBER	BLOW COUNTS (per 6 inches)	PENETRATION/ RECOVERY (in.)	USCS SYMBOL	N	WELL
	Brown f-c SAND, some Gravel, trace Silt	dry to moist		SS-1	18,15 6,5	24/22	SW	21	
	(firm)								
	Olive SILT, some Clay, trace fine Sand, slightly plastic								
5		moist		SS-2	1,2 4,7	24/24	ML	6	
	(medium)								
	Auger and Split Spoon Refusal - End of Boring @ 7.5'								
10									
15									
20									
25									
30									
35									

NOTES:
1. Drilling Method: Track mounted Diedrich D-50 with 2-1/4" i.d. Hollow Stem Auger (HSA)
2. Soil Sampling: 2-inch Split Spoon Sampler driven with 140 lb. hammer falling 30 inches (Auto-Hammer).

CLIENT:
Northeast Civil Solutions

SITE:
Village at Little Falls
7 to 13 Depot Street
South Windham, Maine

Project No.: 064006 Page: 1

OAK ENGINEERS

BORING LOG: B110

Ground Elevation:	See Plan	Total Depth:	5.9 Feet	Logged By:	WAS
GW encountered:	N.O. Feet	Boring Diameter:	6 Inches	Date Drilled:	1/24/07 to 1/24/07
GW @ completion:	N.M. Feet	Well Stickup:	0	Driller:	Northern Test Boring

DEPTH	DESCRIPTION	REMARKS	SAMPLE	SAMPLE NUMBER	BLOW COUNTS (per 6 inches)	PENETRATION/ RECOVERY (in.)	USCS SYMBOL	N	WELL
	Dark Brown SILT and fine SAND	dry to moist		SS-1	3,2 3,5	24/12	ML	5	
	with trace Gravel/Rock pieces	moist		SS-2	2,4 19,9	24/4	ML	23	
5	(loose to firm)	moist - weathered schist pieces		SS-3	10,7 12, 50/5"	23/20	ML	19	
	Auger and Split Spoon Refusal - End of Boring @ 5.9'								
10									
15									
20									
25									
30									
35									

NOTES:
1. Drilling Method: Track mounted Diedrich D-50 with 2-1/4" i.d. Hollow Stem Auger (HSA)
2. Soil Sampling: 2-inch Split Spoon Sampler driven with 140 lb. hammer falling 30 inches (Auto-Hammer).

CLIENT:
Northeast Civil Solutions

SITE:
Village at Little Falls
7 to 13 Depot Street
South Windham, Maine

Project No.: 064006 | Page: 1

VIL_RESP03605

OAK ENGINEERS

BORING LOG: B111

Ground Elevation:	See Plan	Total Depth:	5.7 Feet	Logged By:	WAS
GW encountered:	N.O. Feet	Boring Diameter:	6 Inches	Date Drilled:	1/24/07 to 1/24/07
GW @ completion:	N.M. Feet	Well Stickup:	0	Driller:	Northern Test Boring

DEPTH	DESCRIPTION	REMARKS	SAMPLE	SAMPLE NUMBER	BLOW COUNTS (per 6 inches)	PENETRATION/ RECOVERY (in.)	USCS SYMBOL	N	WELL
0	Brown SAND, some Silt	dry to moist - concrete pieces		SS-1	7,6 5,4	24/14	SM	11	
		moist - concrete pieces		SS-2	8,6 4,5	24/12	SM	10	
5	(loose to firm)	moist - concrete and possible ash pieces		SS-3	5,7 11, 50/2"	20/8	SM	18	
	Auger and Split Spoon Refusal - End of Boring @ 5.7'								
10									
15									
20									
25									
30									
35									

NOTES:
1. Drilling Method: Track mounted Diedrich D-50 with 2-1/4" i.d. Hollow Stem Auger (HSA)
2. Soil Sampling: 2-inch Split Spoon Sampler driven with 140 lb. hammer falling 30 inches (Auto-Hammer).

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SITE:
Village at Little Falls
7 to 13 Depot Street
South Windham, Maine

Project No.: 064006 Page: 1

OAK ENGINEERS

BORING LOG: B112

Ground Elevation:	See Plan	Total Depth:	3.5 Feet	Logged By:	WAS
GW encountered:	N.O. Feet	Boring Diameter:	6 Inches	Date Drilled:	1/24/07 to 1/24/07
GW @ completion:	N.M. Feet	Well Stickup:	0	Driller:	Northern Test Boring

DEPTH	DESCRIPTION	REMARKS	SAMPLE	SAMPLE NUMBER	BLOW COUNTS (per 6 inches)	PENETRATION/ RECOVERY (in.)	USCS SYMBOL	N	WELL
	Brown f-c SAND, trace to little Silt	wet - concrete pieces		SS-1	12,14 9, 50/3"	21/10	SM	23	
	(firm)								
	Auger Refusal - End of Boring @ 3.5'								
5									
10									
15									
20									
25									
30									
35									

NOTES:
1. Drilling Method: Track mounted Diedrich D-50 with 2-1/4" i.d. Hollow Stem Auger (HSA)
2. Soil Sampling: 2-inch Split Spoon Sampler driven with 140 lb. hammer falling 30 inches (Auto-Hammer).

CLIENT:
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SITE:
Village at Little Falls
7 to 13 Depot Street
South Windham, Maine

Project No.: 064006 | Page: 1

OAK ENGINEERS

BORING LOG: B113

Ground Elevation:	See Plan	Total Depth:	16.25 Feet	Logged By:	WAS
GW encountered:	11 Feet	Boring Diameter:	6 Inches	Date Drilled:	1/24/07 to 1/24/07
GW @ completion:	N.M. Feet	Well Stickup:	0	Driller:	Northern Test Boring

DEPTH	DESCRIPTION	REMARKS	SAMPLE	SAMPLE NUMBER	BLOW COUNTS (per 6 inches)	PENETRATION/ RECOVERY (in.)	USCS SYMBOL	N	WELL
	Rust Brown f-c SANDand f-c GRAVEL, trace Silt	dry to moist		SS-1	9,10 10,9	24/20	GM-SM	10	
	becoming Rust Red	moist - red oxide and ash - w = 13.3%		SS-2	10,9 4,3	24/10	GM-SM	13	
5		moist - red oxide and ash		SS-3	3,1 1,1	24/7	GM-SM	2	
	(firm to very loose)	moist - coal ash pieces		SS-4	2,1 1,2	24/9	GM-SM	2	
	Gray fine SAND, some Silt, trace to little organics	moist - ash		SS-5	3,1 1,2	24/12	SM	2	
10	becoming fine to medium SAND, trace to little Silt (very loose)	wet		SS-6	2,2 2,3	24/19	SM	4	
	Gray SILT, some f-m Sand								
15	(firm to dense)	saturated - rock pieces in sample		SS-7	8,14 50/3"	21/15	ML	>100	
	Auger and Split Spoon Refusal - End of Boring @ 16.25'								
20									
25									
30									
35									

NOTES:
1. Drilling Method: Track mounted Diedrich D-50 with 2-1/4" i.d. Hollow Stem Auger (HSA)
2. Soil Sampling: 2-inch Split Spoon Sampler driven with 140 lb. hammer falling 30 inches (Auto-Hammer).

CLIENT:
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SITE:
Village at Little Falls
7 to 13 Depot Street
South Windham, Maine

Project No.: 064006 Page: 1

OAK ENGINEERS

BORING LOG: B114

Ground Elevation:	See Plan	Total Depth:	33 Feet	Logged By:	WAS
GW encountered:	11 Feet	Boring Diameter:	6 Inches	Date Drilled:	1/24/07 to 1/24/07
GW @ completion:	N.M. Feet	Well Stickup:	0	Driller:	Northern Test Boring

DEPTH	DESCRIPTION	REMARKS	SAMPLE	SAMPLE NUMBER	BLOW COUNTS (per 6 inches)	PENETRATION/ RECOVERY (in.)	USCS SYMBOL	N	WELL
	Olive Brown f-c SAND, some Silt (firm)	dry to moist		SS-1	5,12 11,7	24/14	SM	23	
	Black to Dark Brown f-c SAND, trace to little Silt	moist		SS-2	5,5 7,5	24/16	SM	12	
5		moist		SS-3	2,2 2,2	24/12	SM	4	
	(loose)	moist - wood pieces		SS-4	2,2 2,3	24/12	SM	4	
	Olive Brown f-m SAND, some Silt	moist - wood chips and leaves		SS-5	1,1 2,2	24/16	SM	3	
10		wet - wood pieces/chips		SS-6	3,4 4,3	24/19	SM	8	
15	(loose)	saturated - large wood pieces		SS-7	3,3 3,3	24/11	SM	6	
	Blue Gray CLAY, trace Silt, trace fine Sand								
20		wet to saturated		SS-8	1,2 2,1	24/20	CL	4	
		Su = 930 psf, w = 43.0%		ST-1			CL		
25		wet		SS-9	1,1 1,1	24/24	CL	2	
30		wet		SS-10	1,1 1,2	24/24	CL	2	
	(soft)								
	Auger Refusal - End of Boring @ 33'								
35									

NOTES:
1. Drilling Method: Track mounted Diedrich D-50 with 2-1/4" i.d. Hollow Stem Auger (HSA)
2. Soil Sampling: 2-inch Split Spoon Sampler driven with 140 lb. hammer falling 30 inches (Auto-Hammer).

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Northeast Civil Solutions

SITE:
Village at Little Falls
7 to 13 Depot Street
South Windham, Maine

Project No.: 064006 Page: 1

OAK ENGINEERS

BORING LOG: B115

Ground Elevation:	See Plan	Total Depth:	20.8 Feet	Logged By:	WAS
GW encountered:	8 Feet	Boring Diameter:	6 Inches	Date Drilled:	1/24/07 to 1/24/07
GW @ completion:	N.M. Feet	Well Stickup:	0	Driller:	Northern Test Boring

DEPTH	DESCRIPTION	REMARKS	SAMPLE	SAMPLE NUMBER	BLOW COUNTS (per 6 inches)	PENETRATION/ RECOVERY (in.)	USCS SYMBOL	N	WELL
	Black to Dark Brown f-c SAND, some Gravel, trace to little Silt	dry to moist - ash and coal pieces		SS-1	22,18 7,3	24/18	SM	25	
		moist - ash and coal pieces		SS-2	2,2 1,2	24/8	SM	3	
5		moist - ash and coal pieces		SS-3	2,1 2,2	24/10	SM	3	
		moist to wet - brick pieces		SS-4	3,4 2,3	24/8	SM	6	
	(very loose to loose)	saturated - brick pieces		SS-5	2,2 1,1	24/6	SM	3	
10	Gray fibrous organic SILT, trace fine Sand	saturated - 5.8% organics, w = 52.9%		SS-6	2,2 2,7	24/8	SM-OL	4	
	(loose)								
	Gray f-c SAND, little Silt								
15		saturated, wood and timber pieces		SS-7	2,3 4,5	24/17	SM	7	
	(loose)								
	Gray CLAY, some Silt, plastic								
20	(soft)	saturated - rock pieces		SS-8	4, 50/3"	9/4	ML	>100	
	Auger and Split Spoon Refusal - End of Boring @ 20.8'								
25									
30									
35									

NOTES:
1. Drilling Method: Track mounted Diedrich D-50 with 2-1/4" i.d. Hollow Stem Auger (HSA)
2. Soil Sampling: 2-inch Split Spoon Sampler driven with 140 lb. hammer falling 30 inches (Auto-Hammer).

CLIENT:
Northeast Civil Solutions

SITE:
Village at Little Falls
7 to 13 Depot Street
South Windham, Maine

Project No.: 064006 | Page: 1

VIL_RESP03610

OAK ENGINEERS

BORING LOG: B116

Ground Elevation:	See Plan	Total Depth:	3.8 Feet	Logged By:	WAS
GW encountered:	N.O. Feet	Boring Diameter:	6 Inches	Date Drilled:	1/24/07 to 1/24/07
GW @ completion:	N.M. Feet	Well Stickup:	0	Driller:	Northern Test Boring

DEPTH	DESCRIPTION	REMARKS	SAMPLE	SAMPLE NUMBER	BLOW COUNTS (per 6 inches)	PENETRATION/ RECOVERY (in.)	USCS SYMBOL	N	WELL
	Dark Brown to Black f-c SAND, little SILT	dry to moist - brick pieces		SS-1	3,3 4,4	24/14	SM	7	
	(loose)	moist - brick pieces		SS-2	3,5 50/3"	15/5	SM	>100	
	Auger Refusal - End of Boring @ 3.8'								
5									
10									
15									
20									
25									
30									
35									

NOTES:
1. Drilling Method: Track mounted Diedrich D-50 with 2-1/4" i.d. Hollow Stem Auger (HSA)
2. Soil Sampling: 2-inch Split Spoon Sampler driven with 140 lb. hammer falling 30 inches (Auto-Hammer).

CLIENT:
Northeast Civil Solutions

SITE:
Village at Little Falls
7 to 13 Depot Street
South Windham, Maine

Project No.: 064006 Page: 1

OAK ENGINEERS

BORING LOG: B117

Ground Elevation:	See Plan	Total Depth:	18 Feet	Logged By:	WAS
GW encountered:	9 Feet	Boring Diameter:	6 inches	Date Drilled:	1/24/07 to 1/24/07
GW @ completion:	N.M. Feet	Well Stickup:	0	Driller:	Northern Test Boring

DEPTH	DESCRIPTION	REMARKS	SAMPLE	SAMPLE NUMBER	BLOW COUNTS (per 6 inches)	PENETRATION/ RECOVERY (in.)	USCS SYMBOL	N	WELL
	Gray to Brown f-c SAND, some fine Gravel, some Silt	dry to moist		SS-1	17,15 5,3	24/18	SM	20	
		moist, with ash - w = 6.1%		SS-2	3,3 5,3	24/14	SM	8	
5		moist - ash		SS-3	9,11 7,23	24/8	SM	18	
		moist - ash		SS-4	5,6 5,5	24/7	SM	11	
		wet - ash		SS-5	3,4 4,4	24/3	SM	8	
10	becoming dark gray to black	saturated - ash		SS-6	5,5 7,5	24/3	SM	12	
	(loose to firm)								
	Olive to Blue CLAY, some Silt, plastic								
15		moist - PP = 4.0 tsf		SS-7	9,11 17, 50/4"	20/17	CL	28	
	(stiff)								
	Auger Refusal - End of Boring @ 18'								
20									
25									
30									
35									

NOTES:
1. Drilling Method: Track mounted Diedrich D-50 with 2-1/4" i.d. Hollow Stem Auger (HSA)
2. Soil Sampling: 2-inch Split Spoon Sampler driven with 140 lb. hammer falling 30 inches (Auto-Hammer).

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Northeast Civil Solutions

SITE:
Village at Little Falls
7 to 13 Depot Street
South Windham, Maine

Project No.: 064006 Page: 1

VIL_RESP03612

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BORING LOG: B118

Ground Elevation:	See Plan	Total Depth:	22 Feet	Logged By:	WAS
GW encountered:	11 Feet	Boring Diameter:	6 inches	Date Drilled:	1/24/07 to 1/24/07
GW @ completion:	N.M. Feet	Well Stickup:	0	Driller:	Northern Test Boring

DEPTH	DESCRIPTION	REMARKS	SAMPLE	SAMPLE NUMBER	BLOW COUNTS (per 6 inches)	PENETRATION/ RECOVERY (in.)	USCS SYMBOL	N	WELL
	Gray f-m SAND, little Silt, little Gravel	dry to moist		SS-1	15,12 9,11	24/11	SM	21	
	becoming Black m-c SAND	moist		SS-2	9,17 29,23	24/14	SM	46	
5		moist		SS-3	9,8 21, 50/4"	22/15	SM	29	
10	becoming some fine silt	moist - concrete pieces		SS-4	10,17 10,12	24/17	SM	27	
15		wet		SS-5	21,12 11,12	24/1	SM	23	
20	(firm to dense)			SS-6	12,21 27,31	24/0	SM	48	
	Auger Refusal - End of Boring @ 22'								
25									
30									
35									

NOTES:
1. Drilling Method: Track mounted Diedrich D-50 with 2-1/4" i.d. Hollow Stem Auger (HSA)
2. Soil Sampling: 2-inch Split Spoon Sampler driven with 140 lb. hammer falling 30 inches (Auto-Hammer).

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SITE:
Village at Little Falls
7 to 13 Depot Street
South Windham, Maine

Project No.: 064006 Page: 1

OAK ENGINEERS

BORING LOG: B119

Ground Elevation:	See Plan	Total Depth:	18 Feet	Logged By:	WAS
GW encountered:	11 Feet	Boring Diameter:	6 Inches	Date Drilled:	1/24/07 to 1/24/07
GW @ completion:	N.M. Feet	Well Stickup:	0	Driller:	Northern Test Boring

DEPTH	DESCRIPTION	REMARKS	SAMPLE	SAMPLE NUMBER	BLOW COUNTS (per 6 inches)	PENETRATION/ RECOVERY (in.)	USCS SYMBOL	N	WELL
	Gray f-m SAND, little Silt, little Gravel	dry to moist		SS-1	12,16 18,11	24/14	SM	34	
	becoming Dark Brown to Black m-c SAND	moist		SS-2	8,5 20,25	24/12	SM	25	
5		moist		SS-3	7,17 21,14	24/18	SM	38	
10	(loose to firm)	wet		SS-4	10,15 15,18	24/17	ML	30	
	Olive Silt, little Clay, trace fine Sand								
15		wet		SS-5	19,13 11,12	24/13	ML	24	
	(medium to stiff)								
	Auger Refusal - End of Boring @ 18'								
20									
25									
30									
35									

NOTES:
1. Drilling Method: Track mounted Diedrich D-50 with 2-1/4" i.d. Hollow Stem Auger (HSA)
2. Soil Sampling: 2-inch Split Spoon Sampler driven with 140 lb. hammer falling 30 inches (Auto-Hammer).

CLIENT:
Northeast Civil Solutions

SITE:
Village at Little Falls
7 to 13 Depot Street
South Windham, Maine

Project No.: 064006 | Page: 1

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TEST PIT LOG

Project: Geotechnical Investigation	Project No. 064006	
TEST PIT IDENTIFICATION: TP101		
Location: 12 Depot St, S. Windham, Maine	Ground Elevation:	
Client:	Datum: NA	
Contractor: ESN North Atlantic	Operator: Justin Berger	
Equipment: Bobcat 442 Tracked Excavator	Samples Collected ☐Yes ☒No	
Capacity/Reach: 1/2 cubic yard, 16'	Time Started:	Time Completed:
Weather: 35 F, cloudy		
Logged by ALB	Date: 2/21/2006	
Checked by:	Date:	

TEST PIT INFORMATION

Depth of Stratum Change (feet)	Sample No. and Type	Sample Depth (feet)	Soil Description
0-0.5			Topsoil, organics
0.5 - 3'			Dark Brown/Black f-m SAND, little Silt, cobbles
3 - 4.5'			Grayish Brown Clayey Silt
4.5'			Refusal on Bedrock @ 4.5'
			groundwater encountered at 3' bgs (adjacent to creek)

Pit Dimensions (Ft.) Length: 6 Width: 2.5 Depth: 4.5	Remarks: 1) Composite sample submitted to for analysis. 2) Test pit backfilled with native material.

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TEST PIT LOG

Project: Geotechnical Investigation	Project No. 064006	
TEST PIT IDENTIFICATION: TP102		
Location: 12 Depot St, S. Windham, Maine	Ground Elevation:	
Client:	Datum: NA	
Contractor: ESN North Atlantic	Operator: Justin Berger	
Equipment: Bobcat 442 Tracked Excavator	Samples Collected ☐Yes ☒No	
Capacity/Reach: 1/2 cubic yard, 16'	Time Started:	Time Completed:
Weather: 35 F, cloudy		
Logged by ALB	Date: 2/21/2006	
Checked by:	Date:	

TEST PIT INFORMATION

Depth of Stratum Change (feet)	Sample No. and Type	Sample Depth (feet)	Soil Description
0-1.5'			Brown f-m SAND, little Silt, metal, cobbles
1.5 - 2.5'			Tan fine SAND and SILT, weathered rock fragments
2.5'			Refusal on Bedrock @ 2.5'
			no groundwater encountered

Pit Dimensions (Ft.) Length: 6 Width: 3 Depth: 2.5	Remarks: 1) Composite sample submitted to for analysis. 2) Test pit backfilled with native material.

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TEST PIT LOG

Project: Geotechnical Investigation	Project No. 064006	
TEST PIT IDENTIFICATION: TP103		
Location: 12 Depot St, S. Windham, Maine	Ground Elevation:	
Client:	Datum: NA	
Contractor: ESN North Atlantic	Operator: Justin Berger	
Equipment: Bobcat 442 Tracked Excavator	Samples Collected ☐Yes ☒No	
Capacity/Reach: 1/2 cubic yard, 16'	Time Started:	Time Completed:
Weather: 35 F, cloudy		
Logged by ALB	Date: 2/21/2006	
Checked by:	Date:	

TEST PIT INFORMATION

Depth of Stratum Change (feet)	Sample No. and Type	Sample Depth (feet)	Soil Description
0 - 2'			Brown f-m SAND, little Silt, brick, ash
2 - 3.5'			Tan fine SAND and SILT, weathered rock fragments
3.5'			Refusal on Bedrock @ 3.5'
			no groundwater encountered

Pit Dimensions (Ft.) Length: 5.5 Width: 2.5 Depth: 3.5	Remarks: 1) Composite sample submitted to for analysis. 2) Test pit backfilled with native material.

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TEST PIT LOG

Project: Geotechnical Investigation	Project No. 064006	
TEST PIT IDENTIFICATION: TP104		
Location: 12 Depot St, S. Windham, Maine	Ground Elevation:	
Client:	Datum: NA	
Contractor: ESN North Atlantic	Operator: Justin Berger	
Equipment: Bobcat 442 Tracked Excavator	Samples Collected ☐Yes ☒No	
Capacity/Reach: 1/2 cubic yard, 16'	Time Started:	Time Completed:
Weather: 35 F, cloudy		
Logged by ALB	Date: 2/21/2006	
Checked by:	Date:	

TEST PIT INFORMATION

Depth of Stratum Change (feet)	Sample No. and Type	Sample Depth (feet)	Soil Description
0 - 2'			Brown f-m SAND, little Silt, brick, metal
2 - 5'			Light Brown fine to medium SAND, some Silt
5'			Refusal on Bedrock @ 5'
			no groundwater encountered

Pit Dimensions (Ft.) Length: 6 Width: 3 Depth: 5	Remarks: 1) Composite sample submitted to for analysis. 2) Test pit backfilled with native material.

VIL_RESP03618

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TEST PIT LOG

Project: Geotechnical Investigation	Project No. 064006	
TEST PIT IDENTIFICATION: TP105		
Location: 12 Depot St, S. Windham, Maine	Ground Elevation:	
Client:	Datum: NA	
Contractor: ESN North Atlantic	Operator: Justin Berger	
Equipment: Bobcat 442 Tracked Excavator	Samples Collected ☐Yes ☒No	
Capacity/Reach: 1/2 cubic yard, 16'	Time Started:	Time Completed:
Weather: 35 F, cloudy		
Logged by ALB	Date: 2/21/2006	
Checked by:	Date:	

TEST PIT INFORMATION

Depth of Stratum Change (feet)	Sample No. and Type	Sample Depth (feet)	Soil Description
0 - 0.5'			Brown f-m SAND, little Silt, brick, metal
0.5 - 1.5'			Brown fine to medium SAND, little Silt, cobbles
1.5- 5'			Gray-Brown fine to medium SAND, some silt, cobble sized rock fragments
5'			Refusal on Bedrock @ 5'
			no groundwater encountered

Pit Dimensions (Ft.) Length: 6 Width: 3 Depth: 5	Remarks: 1) Composite sample submitted to for analysis. 2) Test pit backfilled with native material.

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TEST PIT LOG

Project: Geotechnical Investigation	Project No. 064006	
TEST PIT IDENTIFICATION: TP106		
Location: 12 Depot St, S. Windham, Maine	Ground Elevation:	
Client:	Datum: NA	
Contractor: ESN North Atlantic	Operator: Justin Berger	
Equipment: Bobcat 442 Tracked Excavator	Samples Collected ☐Yes ☒No	
Capacity/Reach: 1/2 cubic yard, 16'	Time Started:	Time Completed:
Weather: 35 F, cloudy		
Logged by ALB	Date: 2/21/2006	
Checked by:	Date:	

TEST PIT INFORMATION

Depth of Stratum Change (feet)	Sample No. and Type	Sample Depth (feet)	Soil Description
0 - 0.5'			forest mat, organics
0.5 - 2'			Brown fine to medium SAND, little Silt, cobbles, weathered rock fragments
2'			Refusal on Bedrock @ 2' no groundwater encountered

Pit Dimensions (Ft.) Length: 7 Width: 2.5 Depth: 2	Remarks: 1) Composite sample submitted to for analysis. 2) Test pit backfilled with native material.

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TEST PIT LOG

Project: Geotechnical Investigation	Project No. 064006	
TEST PIT IDENTIFICATION: TP107		
Location: 12 Depot St, S. Windham, Maine	Ground Elevation:	
Client:	Datum: NA	
Contractor: ESN North Atlantic	Operator: Justin Berger	
Equipment: Bobcat 442 Tracked Excavator	Samples Collected ☐Yes ☒No	
Capacity/Reach: 1/2 cubic yard, 16'	Time Started:	Time Completed:
Weather: 35 F, cloudy		
Logged by ALB	Date: 2/21/2006	
Checked by:	Date:	

TEST PIT INFORMATION

Depth of Stratum Change (feet)	Sample No. and Type	Sample Depth (feet)	Soil Description
0 - 2'			Brown fine to medium SAND, little Silt, brick, metal, wood, rock fragments
2 - 5.5'			Gray to Brown f-m SAND, "stacked" rock backfill
5.5'			Refusal on Bedrock @ 5.5'
			groundwater seepage into excavation @ 5.5'

Pit Dimensions (Ft.) Length: 5.5 Width: 3 Depth: 5	Remarks: 1) Composite sample submitted to for analysis. 2) Test pit backfilled with native material.

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TEST PIT LOG

Project: Geotechnical Investigation	Project No. 064006	
TEST PIT IDENTIFICATION: TP109		
Location: 12 Depot St, S. Windham, Maine	Ground Elevation:	
Client:	Datum: NA	
Contractor: ESN North Atlantic	Operator: Justin Berger	
Equipment: Bobcat 442 Tracked Excavator	Samples Collected ☐Yes ☒No	
Capacity/Reach: 1/2 cubic yard, 16'	Time Started:	Time Completed:
Weather: 35 F, cloudy		
Logged by ALB	Date: 2/21/2006	
Checked by:	Date:	

TEST PIT INFORMATION

Depth of Stratum Change (feet)	Sample No. and Type	Sample Depth (feet)	Soil Description
			Compacted fill, construction debris (metal and concrete)
			Large void to ~ 6' down along side foundation wall (block wall)
			excavation could not be advance beyond 6" with excavator due to frost and concrete slab

Pit Dimensions (Ft.)
Length: n/a
Width: n/a
Depth: n/a

Remarks:
1) Composite sample submitted to for analysis.
2) Test pit backfilled with native material.

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TEST PIT LOG

Project: Geotechnical Investigation	Project No. 064006	
TEST PIT IDENTIFICATION: TP110		
Location: 12 Depot St, S. Windham, Maine	Ground Elevation:	
Client:	Datum: NA	
Contractor: ESN North Atlantic	Operator: Justin Berger	
Equipment: Bobcat 442 Tracked Excavator	Samples Collected ☐Yes ☒No	
Capacity/Reach: 1/2 cubic yard, 16'	Time Started:	Time Completed:
Weather: 35 F, cloudy		
Logged by ALB	Date: 2/21/2006	
Checked by:	Date:	

TEST PIT INFORMATION

Depth of Stratum Change (feet)	Sample No. and Type	Sample Depth (feet)	Soil Description
0 - 1.5'			Brown fine to medium SAND, little Silt, cobbles and weathered rock
1.5'			Refusal on Bedrock @ 1.5'
			groundwater seepage into excavation @ 5.5'

Pit Dimensions (Ft.) Length: 6 Width: 2 Depth: 1.5	Remarks: 1) Composite sample submitted to for analysis. 2) Test pit backfilled with native material.

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TEST PIT LOG

Project: Geotechnical Investigation	Project No. 064006	
TEST PIT IDENTIFICATION: TP111		
Location: 12 Depot St, S. Windham, Maine	Ground Elevation:	
Client:	Datum: NA	
Contractor: ESN North Atlantic	Operator: Justin Berger	
Equipment: Bobcat 442 Tracked Excavator	Samples Collected ☐Yes ☒No	
Capacity/Reach: 1/2 cubic yard, 16'	Time Started:	Time Completed:
Weather: 35 F, cloudy		
Logged by ALB	Date: 2/21/2006	
Checked by:	Date:	

TEST PIT INFORMATION

Depth of Stratum Change (feet)	Sample No. and Type	Sample Depth (feet)	Soil Description
0 - 2'			Topsoil, Organics
0.5 - 4.5'			Dark Brown f-m SAND, trace Silt, brick, concrete, metal, ash
4.5 - 6.5'			Tan fine SAND and Silt, some weathered bedrock
6.5'			refusal on bedrock @ 6.5'
			No groundwater encountered

Pit Dimensions (Ft.) Length: 6.5 Width: 3 Depth: 6.5	Remarks: 1) Composite sample submitted to for analysis. 2) Test pit backfilled with native material.

OAK

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Soil Classification Terms

Grain Size		
Material	*Fraction*	*Sieve Size*
Boulders		12" +
Cobbles		3"–12"
Gravel	coarse	¾"–3"
	fine	No. 4 to ¾"
Sand	coarse	No. 10 to No. 4
	medium	No. 40 to No. 10
	fine	No. 200 to No. 40
Fines (Silt & Clay)		Passing No. 200

Identification of soil type is made on the basis of an estimate of particle sizes, and in the case of fine-grained soils, also on basis of plasticity.

Coarse and Fine Grained Soils	
Descriptive Adjective	**Percentage Requirement*
Trace	1–10%
Little	10–20%
Some	20–35%
And	35–50%

When sampling gravelly soils with a standard split spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter.
*Percentage measured by weight.

Standard Penetration Values (N) v. Relative Density & Consistency

GRANULAR		COHESIVE	
N	*Relative Density (%)*	*N*	*Consistency*
		<2	Very Soft
0–4	Very Loose (0-15)	2–4	Soft
4–10	Loose (15-35)	4–8	Medium
10–30	Firm (35-65)	8–15	Stiff
30–50	Dense (65-85)	15–30	Very Stiff
>50	Very Dense (>85)	>30	Hard

OAK

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Rock Classification Terms

Weathering Classification		
Grade	*Symbol*	*Diagnostic Features*
Fresh	F	No visible sign of decomposition or discoloration. Rings under hammer impact.
Slightly Weathered	WS	Slight discoloration inwards from open fracture, otherwise similar to F.
Moderately Weathered	WM	Discoloration throughout. Weaker mineral such as feldspar decomposed. Strength somewhat less than fresh rock but cores can not be broken by hand or scraped by knife.
Highly Weathered	WH	Most minerals somewhat decomposed. Specimens can be broken by hand with effort or shaved with knife. Core stones present in rock mass. Texture becoming distinct but fabric.
Completely Weathered	WC	Minerals decomposed to soil but fabric and structure preserved (Saprolite). Specimens easily crumbled or penetrated.
Residual Soil	RS	Advanced state of decomposition resulting in Plastic soils. Rock fabric and structure completely destroyed. Large volume change.

Rock Descriptors			
Term		Meaning	
Hardness	Soft	Scratched by fingernail	
	Medium Hard	Scratched easily by penknife	
	Hard	Scratched with difficulty by penknife	
	Very Hard	Cannot be scratched by penknife	
Jointing/ Fractures	Slight	2 to 6 ft. spacing	
	Moderate	8in. to 2 ft.	
	High	2 in. to 8 in.	
	Intense	< 2in.	
Bedding	Laminated	(< 1")	Natural Break in Rock Layers
	Thin Bedded	(1" - 4")	
	Bedded	(4" - 12")	
	Thick Bedded	(12" - 36")	
	Massive	(> 36")	

OAK

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Unified System Classification of Soils (ASTM D-2487)

Major Divisions			Group Symbols	Typical Names
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels 50% or more of coarse fracton retained on No. 4 sieve	Clean Gravels	GW	Well-graded gravels and gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines.
		Gravels w/ Fines	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	Sands More than 50% coarse fraction passes No. 4 sieve	Clean Sands	SW	Well-graded sands and gravelly sands little or no fines.
			SP	Poorly graded sands and gravelly sands little or no fines.
		Sands w/ Fines	SM	Silty gravels, gravel-sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
Fine-Grained Soils 50% or more passes No. 200 sieve	Silts and Clays Liquid Limit 50% or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey sands.
			CL	Inorganic clays of low plasticity, gravelly clays, sandy clays, silty clays.
			OL	Organic silts and organic silty clays of low plasticity.
	Silts and Clays Liquid limit greater than 50%		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity.
Highly Organic Soils			Pt	Peat, much and other highly organic soils

VIL_RESP03627

ATTACHMENT C

Laboratory Analysis

Geotechnical Investigation
Village at Little Falls, LLC
7 to 13 Depot Street
South Windham, Maine

AASHTO R18

GEOTECHNICAL CONSULTING
SITE INSPECTIONS
CONSTRUCTION MATERIALS TESTING

JOHN TURNER CONSULTING, INC.

REPORT OF ATTERBERG LIMITS TEST RESULTS

CLIENT:	Oak Engineers Attn: Mr. Wally Shedd Brown's Wharf Newburyport, MA 01950	PROJECT:	South Windham, Maine 064006
DATE:	February 27, 2007	REPORT #:	07-010-005
Date Received:	01-30-07	Sampled By:	Client
Method Used:	ASTM D 4318	Tested By:	Jim Corti

ID	Source	Depth (Feet)	Material Type	Moisture Content	Liquid Limit	Plastic Limit	Plasticity Index
001	B101 S4	6-8	Clay	27.2%	38	22	16
002	B102 S3	4-6	Silt, t-fs	26.2%	20	N/A	Non-Plastic
004	B105 S2	2-4	Silt, t-g, t-fs	24.7%	23	N/A	Non-Plastic
006	B114 S9	25-27	Clay	38.7%	33	20	13

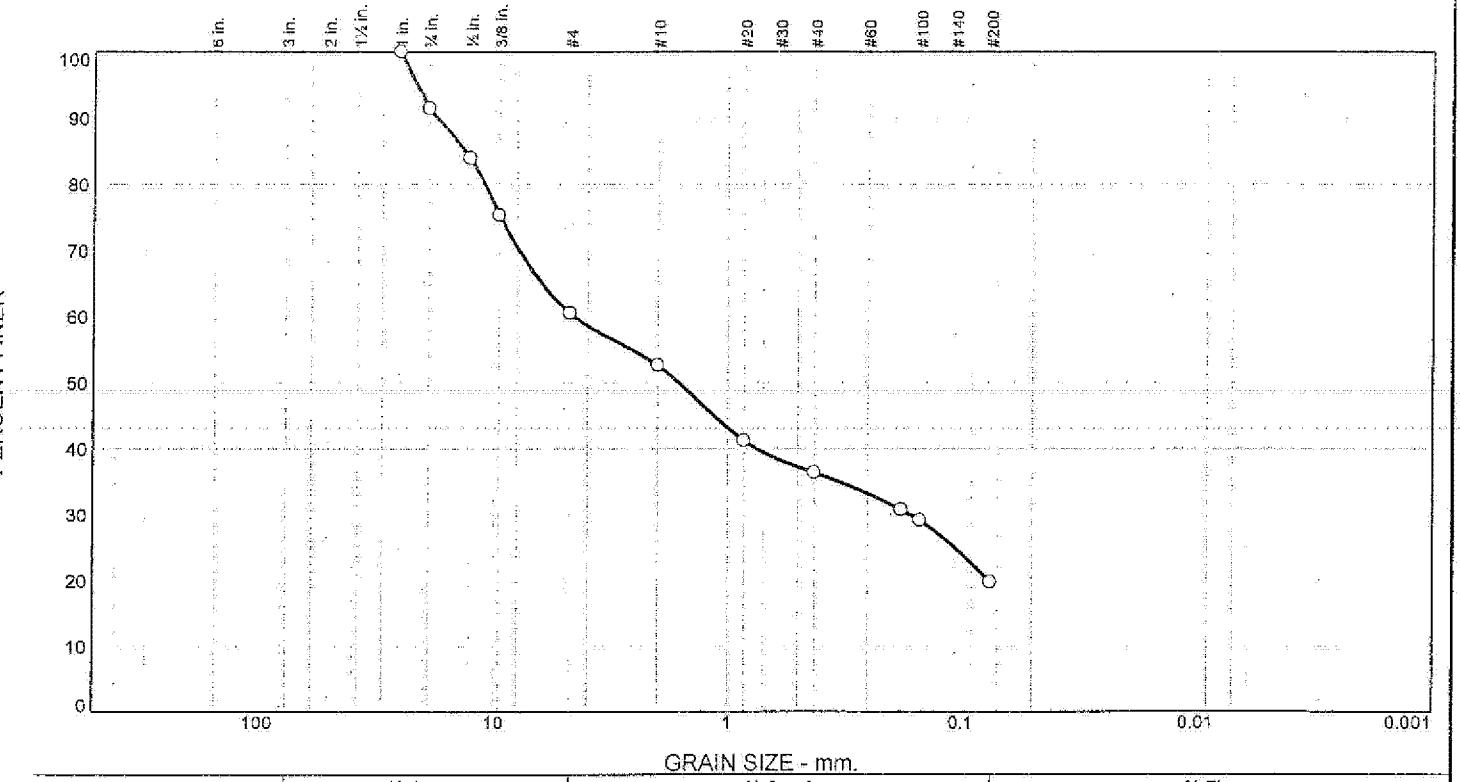
TEAMWORK

Other Office Locations:
Holly Street, Scarborough, ME

19 Dover Street, Dover, NH, 03820
Phone: 603-749-1841 *Fax: 603- 516-6851*

VIL_RESP03629

Particle Size Distribution Chart



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.6	30.9	7.9	16.3	16.6	19.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	91.4		
1/2	84.0		
3/8	75.3		
#4	60.5		
#10	52.6		
#20	41.1		
#40	36.3		
#80	30.7		
#100	29.1		
#200	19.7		

* (no specification provided)

Material Description

MEDIUM-FINE SAND & FINE GRAVEL, little silt and/or clay

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= AASHTO=

Coefficients

D_{85}= 13.3033 D_{60}= 4.5722 D_{50}= 1.6283
D_{30}= 0.1659 D_{15}= D_{10}=
C_u= C_c=

Date Tested: 2-1-07 **Tested By:** Jim Corti

Remarks

Moisture Content: 12.5%

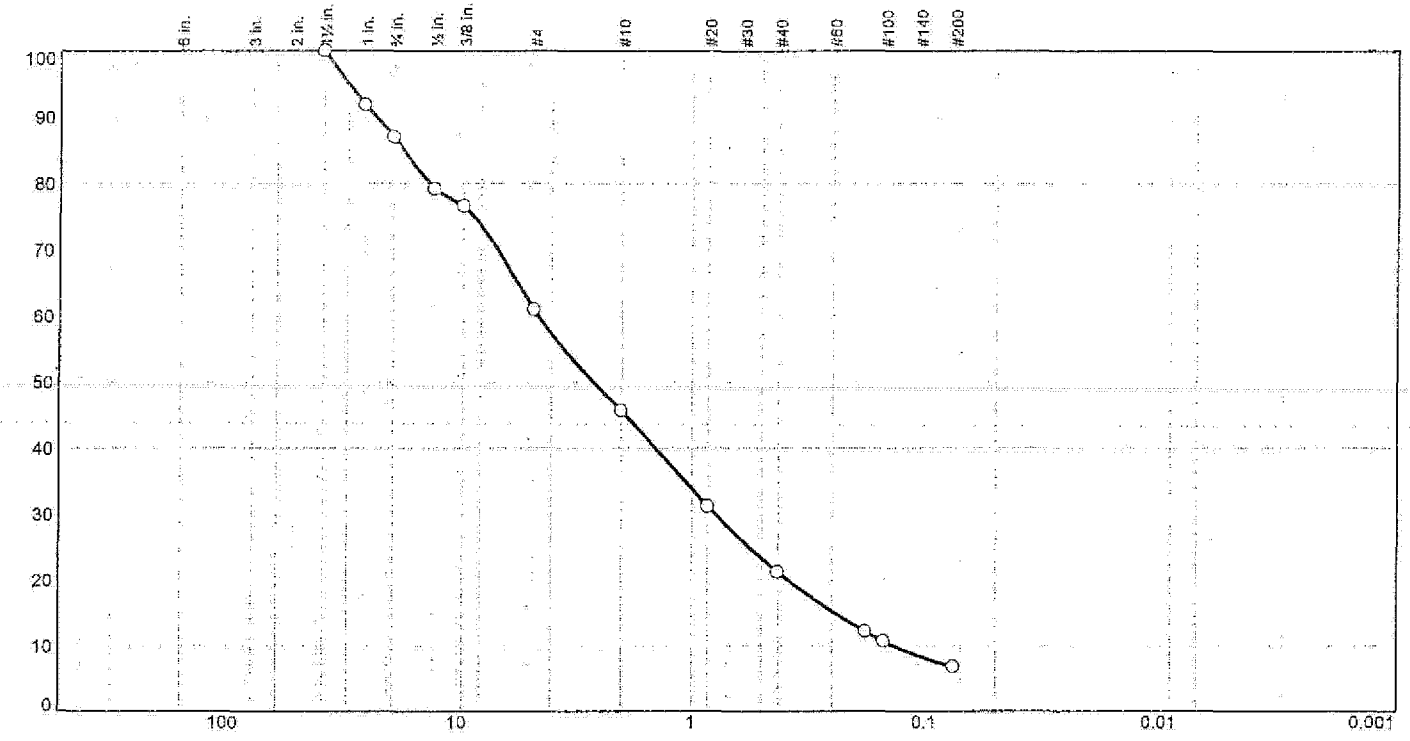
Sample No.: 003 **Source of Sample:** B 103 **Date Sampled:** 1-29-07
Location: S 5 **Elev./Depth:** 8.0-10.0 feet
Checked By: John Turner **Title:** President

JOHN TURNER
Dover, NH

Client: Oak Engineers
Project: South Windham, Maine
Proj. No. 064006
Project No: 07-010 **Figure** 001

VIL_RESP03630

Particle Size Distribution Chart



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.0	26.1	15.3	24.5	14.4	6.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	91.8		
3/4	87.0		
1/2	79.1		
3/8	76.5		
#4	60.9		
#10	45.6		
#20	31.1		
#40	21.1		
#80	12.1		
#100	10.6		
#200	6.7		

* (no specification provided)

Material Description

COARSE-MEDIUM-FINE SAND & COARSE-FINE GRAVEL, some silt

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= AASHTO=

Coefficients

D_{85}= 17.3050 D_{60}= 4.5740 D_{50}= 2.6527
D_{30}= 0.7951 D_{15}= 0.2464 D_{10}= 0.1384
C_u= 33.05 C_c= 1.00

Date Tested: 2-1-07 **Tested By:** Jim Corti

Remarks

Moisture Content: 13.3%

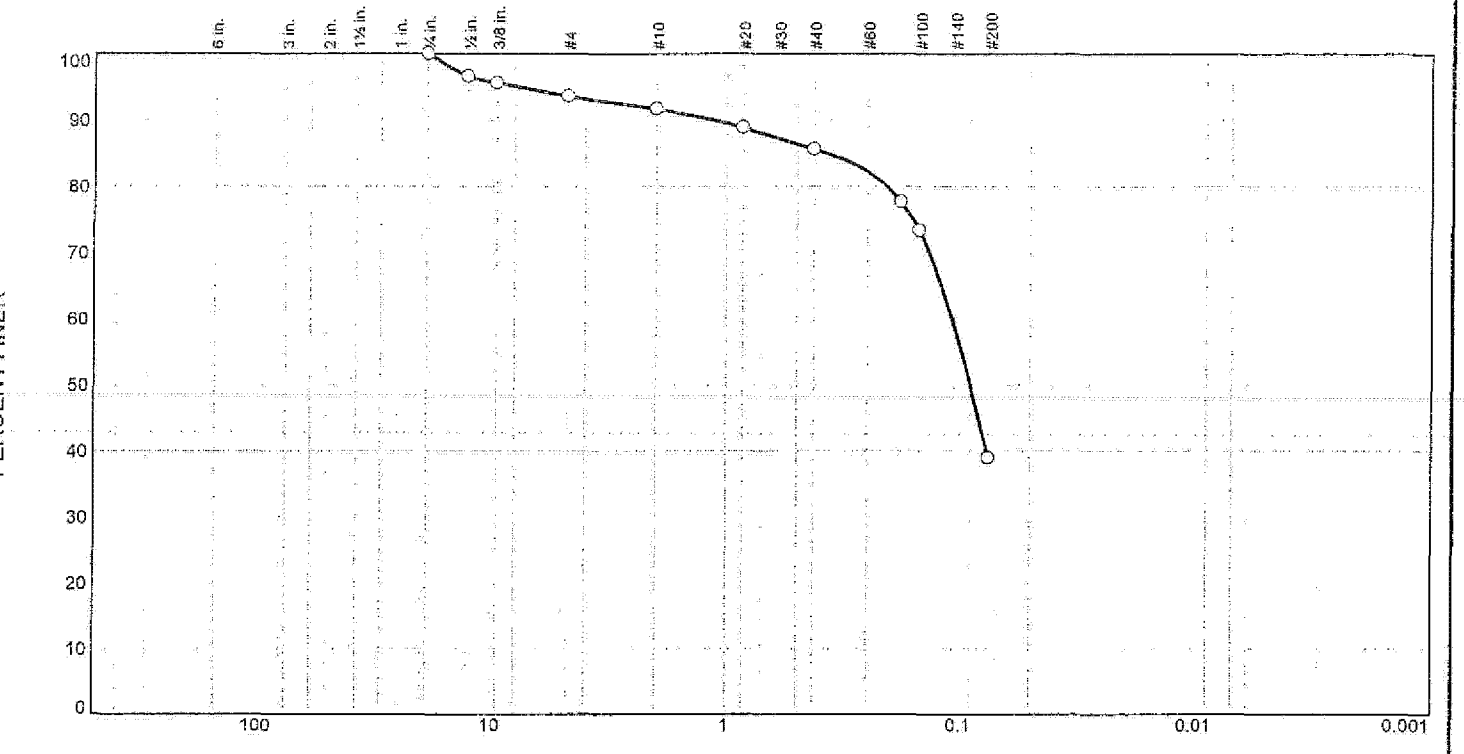
Sample No.: 005 **Source of Sample:** B 113 **Date Sampled:** 1-29-07
Location: S 2 **Elev./Depth:** 2.0-4.0 feet
Checked By: John Turner **Title:** President

JOHN TURNER
Dover, NH

Client: Oak Engineers
Project: South Windham, Maine
Proj. No. 064006
Project No: 07-010 **Figure** 002

VIL_RESP03631

Particle Size Distribution Chart



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	6.4	2.0	6.1	46.6	38.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	96.5		
3/8	95.5		
#4	93.6		
#10	91.6		
#20	88.8		
#40	85.5		
#80	77.6		
#100	73.3		
#200	38.9		

* (no specification provided)

Material Description

FINE SAND & SILT and/or CLAY, trace fine gravel

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= AASHTO=

Coefficients

D_{85}= 0.3805 D_{60}= 0.1088 D_{50}= 0.0906
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Date Tested: 2-1-07 **Tested By:** Jim Corti

Remarks

(w-d)/d Moisture Content: 52.9% Organic Content: 5.8% Ash Content: 94.2%

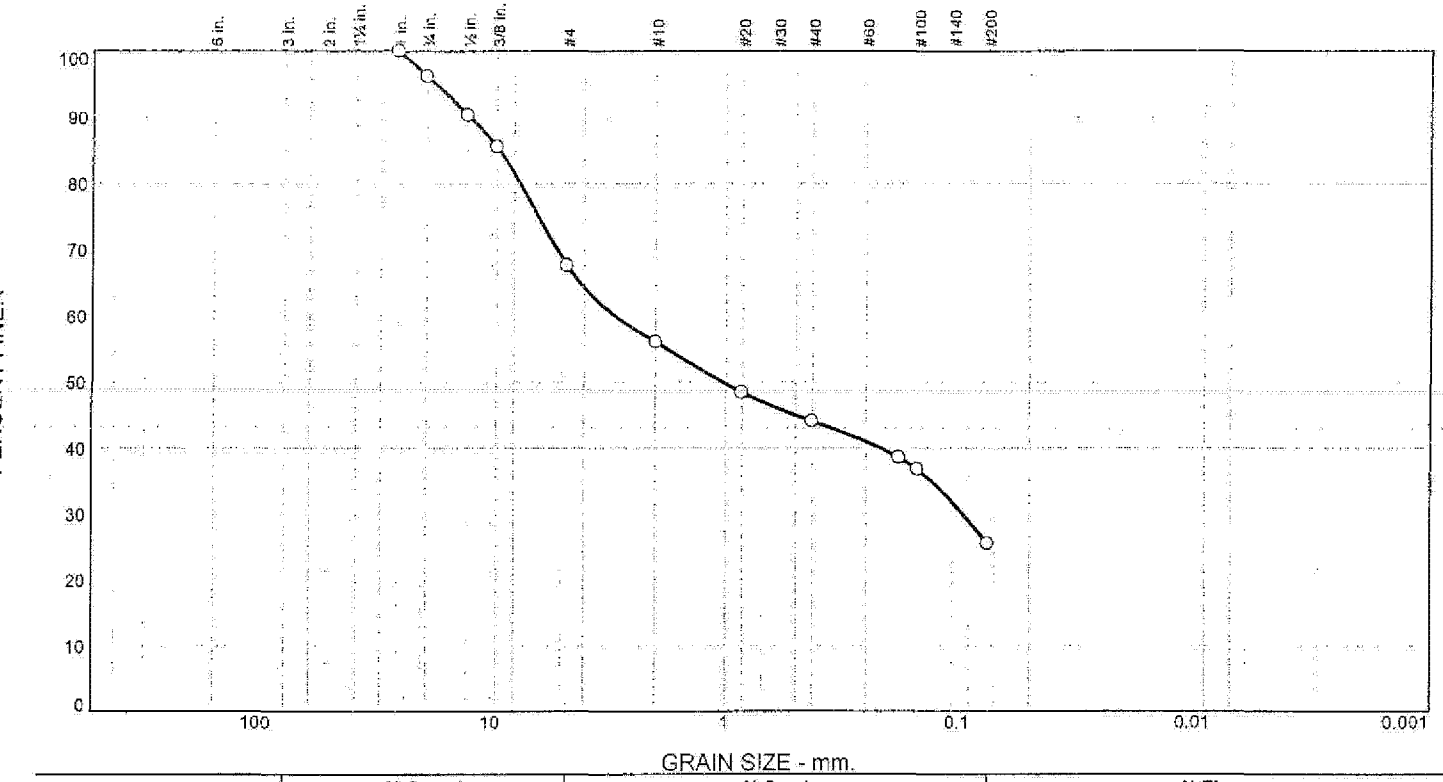
Sample No.: 007 **Source of Sample:** B 115 **Date Sampled:** 1-29-07
Location: S 6 **Elev./Depth:** 10.0-12.0 feet
Checked By: John Turner **Title:** President

JOHN TURNER
Dover, NH

Client: Oak Engineers
Project: South Windham, Maine
Proj. No. 064006
Project No: 07-010 **Figure** 003

VIL_RESP03632

Particle Size Distribution Chart



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.8	28.6	11.6	12.0	18.5	25.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	96.2		
1/2	90.3		
3/8	85.5		
#4	67.6		
#10	56.0		
#20	48.4		
#40	44.0		
#80	38.5		
#100	36.7		
#200	25.5		

* (no specification provided)

Material Description

COARSE-MEDIUM-FINE SAND, some fine gravel, some silt and/or clay

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= AASHTO=

Coefficients

D_{85}= 9.2887 D_{60}= 2.9970 D_{50}= 1.0400
D_{30}= 0.0959 D_{15}= D_{10}=
C_u= C_c=

Date Tested: 2-1-07 **Tested By:** Jim Corti

Remarks

Moisture Content: 6.1%

Sample No.: 008 **Source of Sample:** B 117 **Date Sampled:** 1-29-07
Location: S 2 **Elev./Depth:** 2.0-4.0 feet
Checked By: John Turner **Title:** President

JOHN TURNER
Dover, NH

Client: Oak Engineers
Project: South Windham, Maine
Proj. No. 064006
Project No: 07-010 **Figure** 004

VIL_RESP03633

GeoTesting
express

1145 Massachusetts Avenue
Boxborough, MA 01719
978 635 0424 Tel
978 635 0266 Fax

Transmittal

TO:

Mr. Wendell Shedd
Oak Engineers
Browns Wharf
Newburyport, MA 01950

DATE: 2/15/07	GTX NO: 7278
RE: Project No. 064006 – Windham, ME	
Client Project No. 064006	

COPIES	DATE	DESCRIPTION
	2/15/07	**February 2007 Laboratory Test Reports**

REMARKS:

SIGNED: Joe Tomei – Laboratory Manager

CC:

APPROVED BY: Gary Torosian – Director of Testing Services

VIL_RESP03634

GeoTesting
express
a subsidiary of Geosynthetic Corporation

February 15, 2007

Mr. Wendell Shedd
Oak Engineers
Browns Wharf
Newburyport, MA 01950

Re: Project No. 064006 – Windham, ME (GTX-7278)

Dear Mr. Shedd:

Enclosed are the test results you requested for the above referenced project. GeoTesting Express, Inc. (GTX) received one Shelby Tube sample from you on February 1, 2007. This sample was labeled as follows:

B-114 (23-25 ft)

GTX performed the following tests on this sample:

One- Point CU Triaxial (ASTM D 4767)

Incremental Consolidation (ASTM D 2435)

A copy of your test request is attached.

The results presented in this report apply only to the items tested. This report shall not be reproduced except in full, without written approval from GeoTesting Express. The remainder of these samples will be retained for a period of sixty (60) days and will then be discarded unless otherwise notified by you. Please call me if you have any questions or require additional information. Thank you for allowing GeoTesting Express the opportunity of providing you with testing of geosynthetics. We look forward to working with you again in the future.

Respectfully yours,

Joe Tomei
Laboratory Manager

GeoTesting Express, Inc.
1145 Massachusetts Avenue
Boxborough, MA 01719
800 434 1062 Toll Free
978 635 0266 Fax

www.geotesting.com
2662 Holcomb Bridge Road, Suite 310
Alpharetta, GA 30022
770 645 6575 Tel
770 645 6570 Fax

GeoTesting
express

1145 Massachusetts Avenue
Boxborough, MA 01719
978 635 0424 Tel
978 635 0266 Fax

Geotechnical Test Report

February 15, 2007

GTX-7278
Project No. 064006

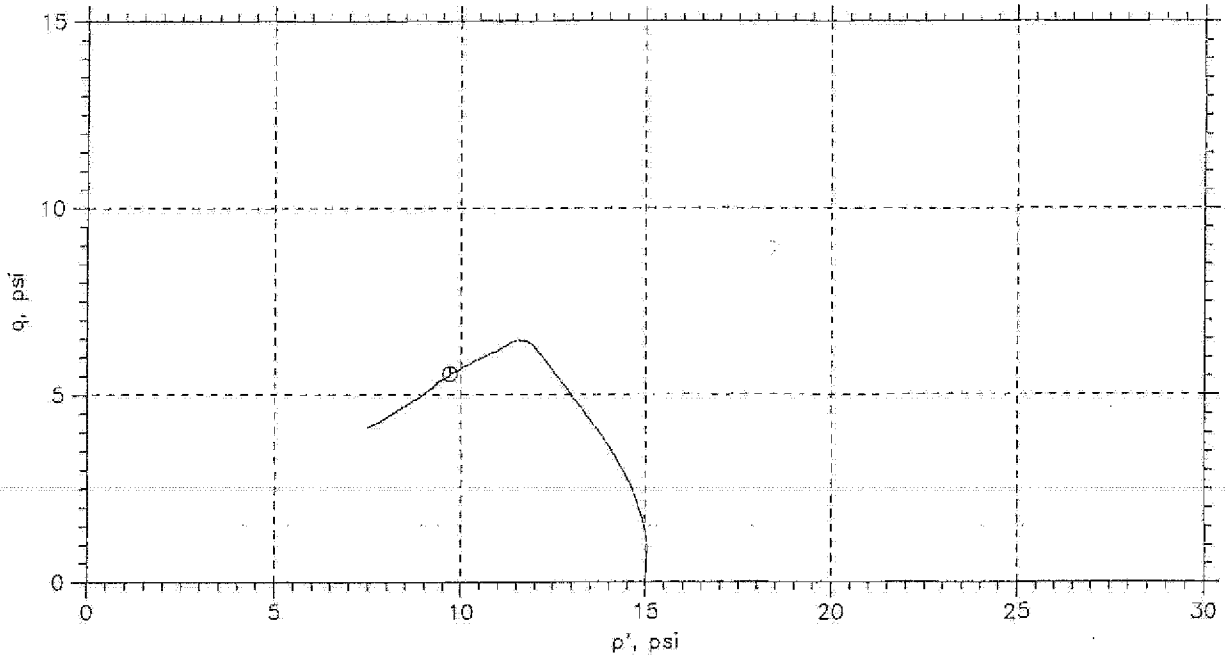
Windham, ME

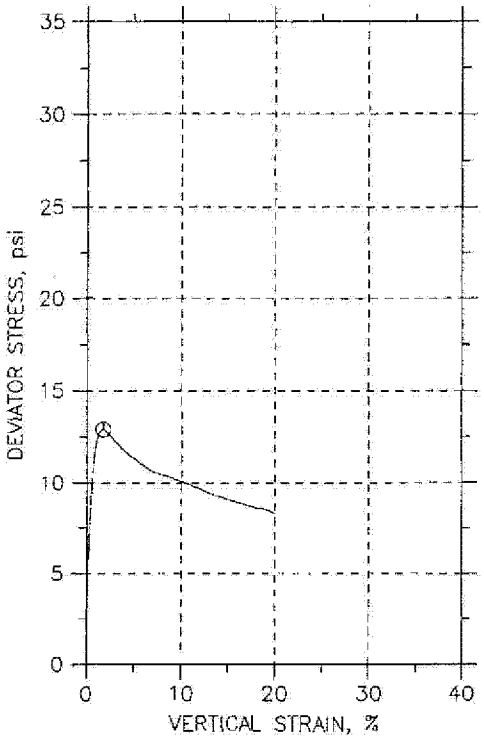
Prepared for:

Oak Engineers

VIL_RESP03637

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767

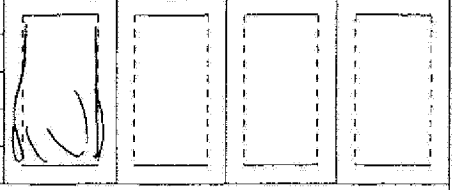




Symbol		⏲			
Sample No.		---			
Test No.		CU-1-1			
Depth		23-25 ft			
Initial	Diameter, in	2.87			
	Height, in	6.05			
	Water Content, %	43.0			
	Dry Density, pcf	79.45			
	Saturation, %	101.8			
	Void Ratio	1.16			
Before Shear	Water Content, %	32.8			
	Dry Density, pcf	90.26			
	Saturation*, %	100.0			
	Void Ratio	0.902			
	Back Press., psi	94.01			
Ver. Eff. Cons. Stress, psi		14.99			
Shear Strength, psi		6.455			
Strain at Failure, %		1.67			
Strain Rate, %/min		0.008			
B-Value		0.96			
Estimated Specific Gravity		2.75			
Liquid Limit		---			
Plastic Limit		---			

GeoTesting express

Project: No. 064006
Location: Windham, ME
Project No.: GTX-7278
Boring No.: B-114
Sample Type: tube
Description: Moist, gray clay with traces of sand
Remarks: System F

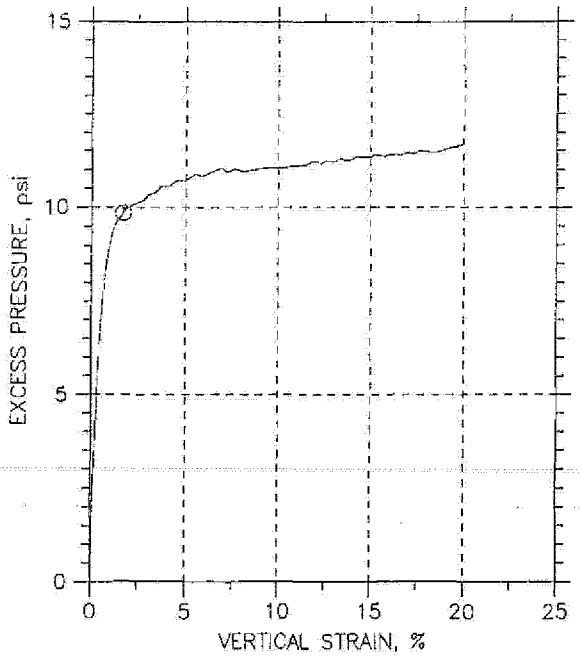


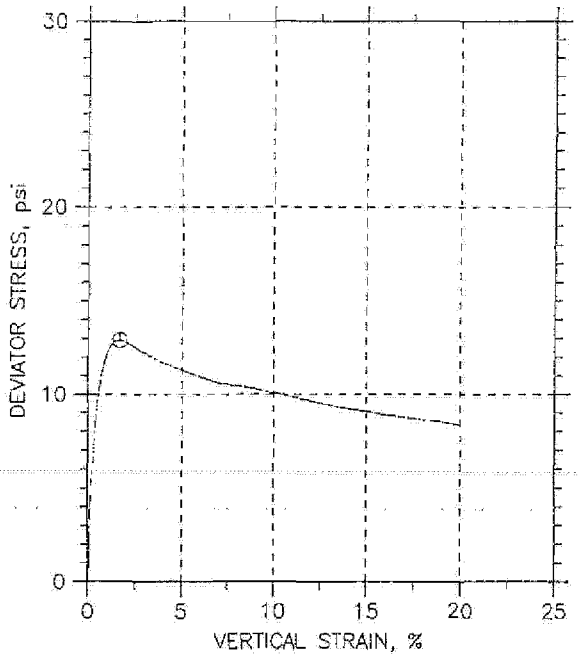
Phase calculations based on start and end of test.
* Saturation is set to 100% for phase calculations.

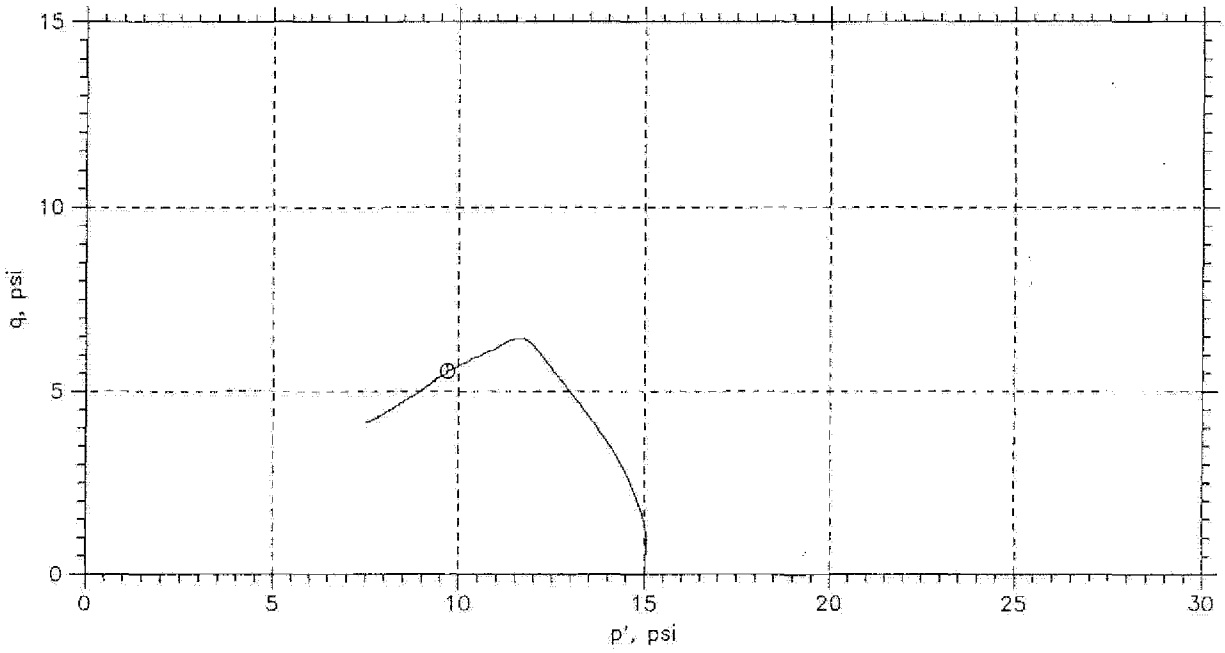
Wed, 14-FEB-2007 14:07:35

VIL_RESP03638

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767







	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
⊙	---	CU-1-1	23-25 ft	yf	02/09/07	jdt		7278-CU1-1.dat

GeoTesting express

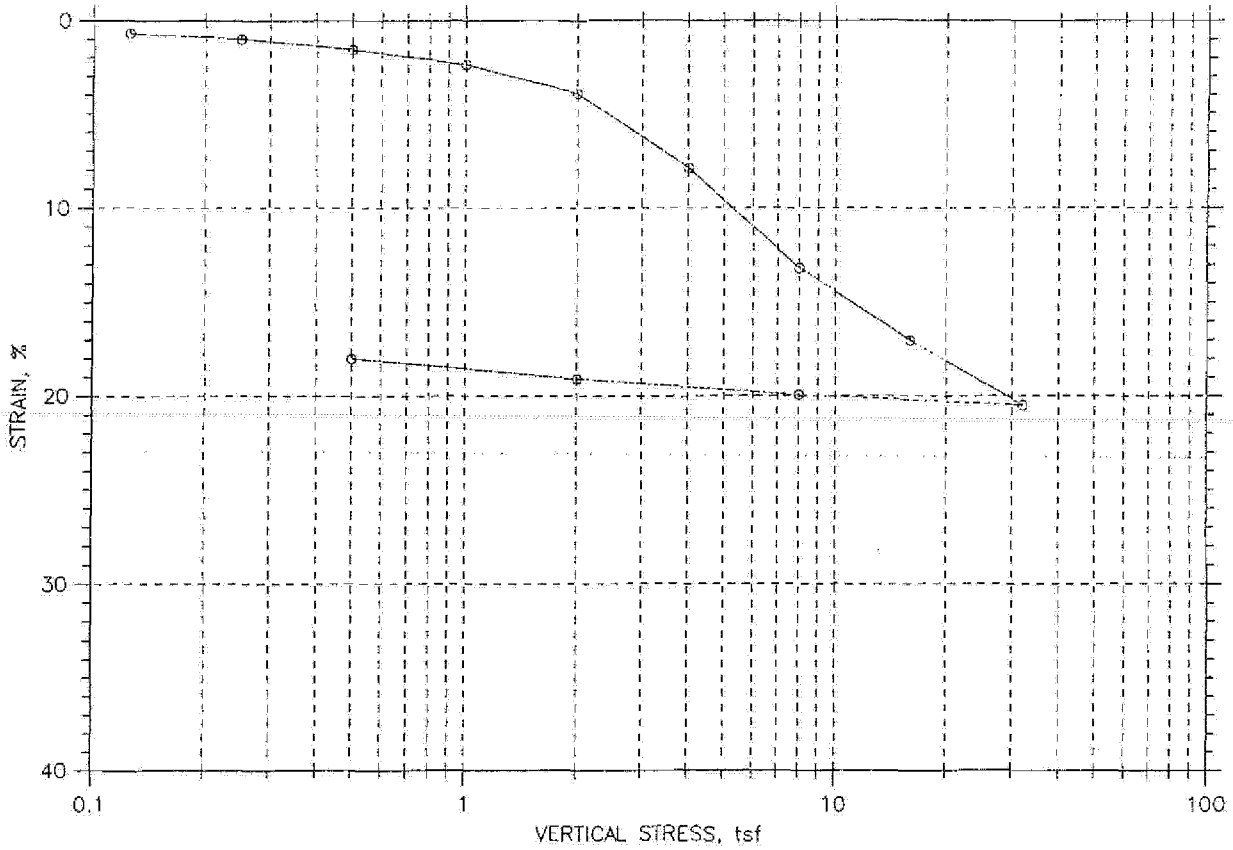
Project: No. 064006	Location: Windham, ME	Project No.: GTX-7278
Boring No.: B-114	Sample Type: tube	
Description: Moist, gray clay with traces of sand		
Remarks: System F		

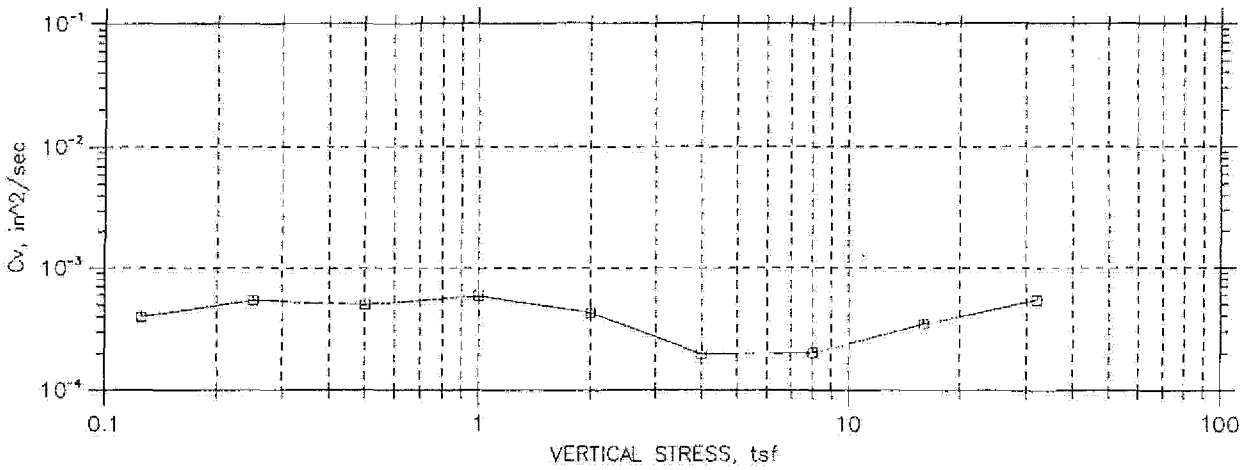
VIL_RESP03639

Wed, 14-FEB-2007 14:07:55

CONSOLIDATION TEST DATA

SUMMARY REPORT





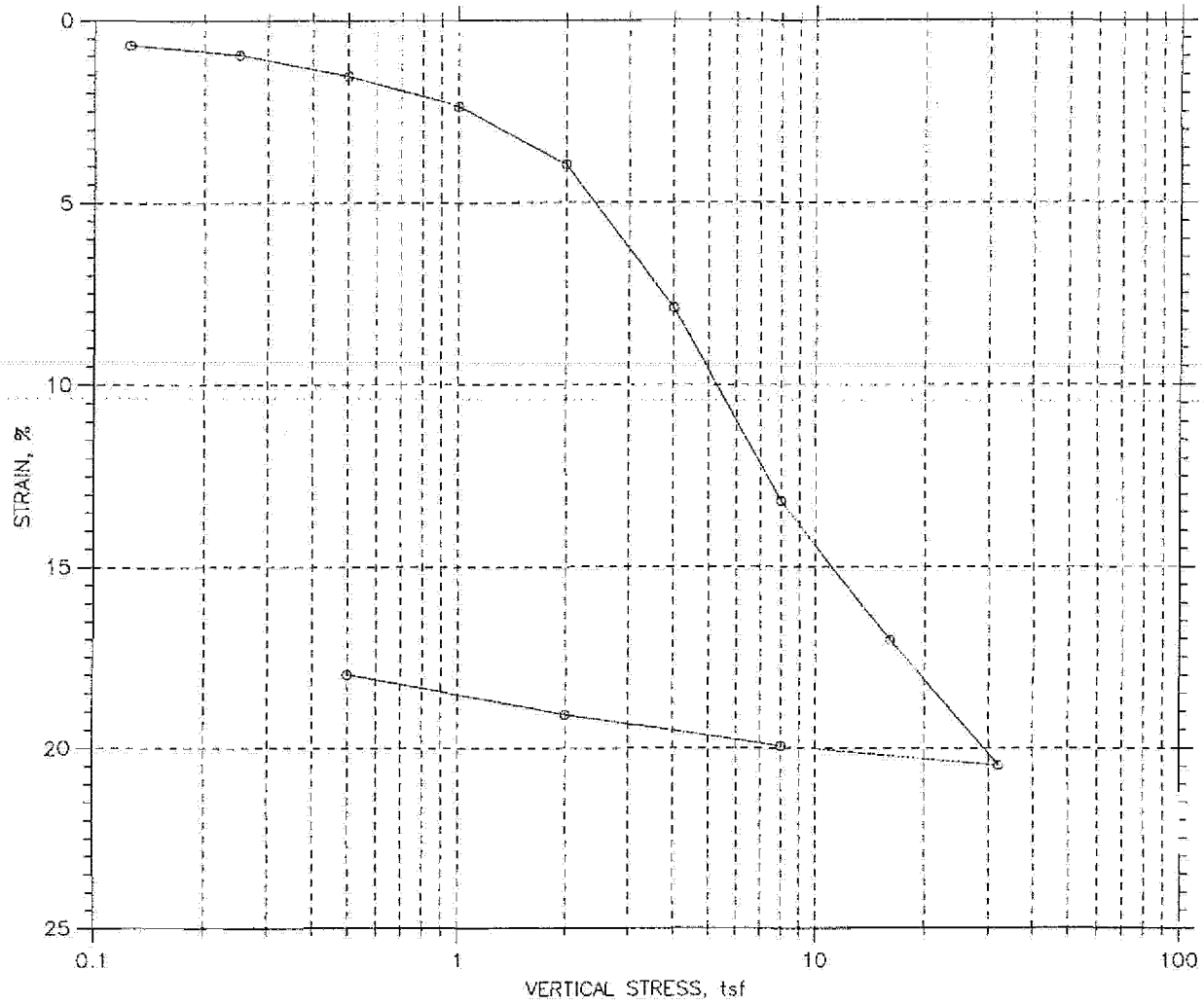
GeoTesting express	Project: No. 064006	Location: Windham, ME	Project No.: GTX-7278
	Boring No.: B-114	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 02/06/07	Depth: 23-25 ft
	Test No.: C-1	Sample Type: Tube	Elevation: ---
	Description: Moist, gray clay with traces of sand		
	Remarks: System G		

VIL_RESP03640

Wed, 14-FEB-2007 13:47:06

CONSOLIDATION TEST DATA

SUMMARY REPORT



					Before Test	After Test
Overburden Pressure: ---				Water Content, %	32.16	20.20
Preconsolidation Pressure: ---				Dry Unit Weight, pcf	90.86	110.8
Compression Index: ---				Saturation, %	98.80	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	0.90	0.56
LL: ---	PL: ---	PI: ---	GS: 2.77			

GeoTesting express	Project: No. 064006	Location: Windham, ME	Project No.: GTX-7278
	Boring No.: B-114	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 02/06/07	Depth: 23-25 ft
	Test No.: C-1	Sample Type: Tube	Elevation: ---
	Description: Moist, gray clay with traces of sand		
	Remarks: System G		

VIL_RESP03641

Wed, 14-FEB-2007 13:47:06

GeoTesting express

CONSOLIDATION TEST DATA

Project: No. 064006 | Location: Windham, ME | Project No.: GTX-7279
Boring No.: B-114 | Tested By: md | Checked By: jdt
Sample No.: --- | Test Date: 02/06/07 | Depth: 23-25 ft
Test No.: C-1 | Sample Type: Tube | Elevation: ---

Soil Description: Moist, gray clay with traces of sand
Remarks: System G

Estimated Specific Gravity: 2.77 | Liquid Limit: --- | Initial Height: 1.00 in
Initial Void Ratio: 0.90 | Plastic Limit: --- | Specimen Diameter: 2.50 in
Final Void Ratio: 0.56 | Plasticity Index: ---

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	Horn Frogs	RING		
Wt. Container + Wet Soil, gm	297.48	371.13	357.13	148.78
Wt. Container + Dry Soil, gm	217.65	333.48	333.48	125.16
Wt. Container, gm	8.04	216.41	216.41	8.24
Wt. Dry Soil, gm	209.61	117.07	117.07	116.92
Water Content, %	38.09	32.16	20.20	20.20
Void Ratio	---	0.90	0.56	---
Degree of Saturation, %	---	98.80	100.00	---
Dry Unit Weight, pcf	---	90.856	110.76	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

VIL_RESP03642

GeoTesting express

CONSOLIDATION TEST DATA

Project: No. 064006
Boring No.: B-114
Sample No.: ---
Test No.: C-1

Location: Windham, ME
Tested By: md
Test Date: 02/06/07
Sample Type: Tube

Project No.: GTX-7278
Checked By: jdt
Depth: 23-25 ft
Elevation: ---

Soil Description: Moist, gray clay with traces of sand
Remarks: System G

	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	T50 Fitting Sq.Rt. min	T50 Fitting Log min	Coefficient of Consolidation Sq.Rt. in^2/sec	Coefficient of Consolidation Log in^2/sec	Coefficient of Consolidation Ave. in^2/sec
1	0.125	0.006742	0.887	0.67	2.0	0.0	4.01e-004	0.00e+000	4.01e-004
2	0.25	0.00964	0.882	0.96	1.4	1.6	5.94e-004	5.01e-004	5.44e-004
3	0.5	0.0154	0.871	1.54	1.5	1.7	5.18e-004	4.85e-004	5.01e-004
4	1	0.02362	0.855	2.36	1.1	1.6	7.14e-004	5.09e-004	5.94e-004
5	2	0.03952	0.825	3.95	1.8	1.8	4.38e-004	4.22e-004	4.30e-004
6	4	0.07889	0.750	7.89	3.6	3.7	2.03e-004	1.95e-004	1.99e-004
7	8	0.1318	0.650	13.18	3.2	3.4	2.07e-004	1.96e-004	2.01e-004
8	16	0.1703	0.577	17.03	1.4	2.0	4.25e-004	2.91e-004	3.45e-004
9	32	0.2048	0.511	20.48	0.9	1.1	6.02e-004	4.96e-004	5.44e-004
10	8	0.1994	0.521	19.94	0.0	0.0	6.63e-002	0.00e+000	6.63e-002
11	2	0.1909	0.538	19.09	0.4	0.0	1.20e-003	0.00e+000	1.20e-003
12	0.5	0.1797	0.559	17.97	3.5	3.9	1.57e-004	1.39e-004	1.47e-004

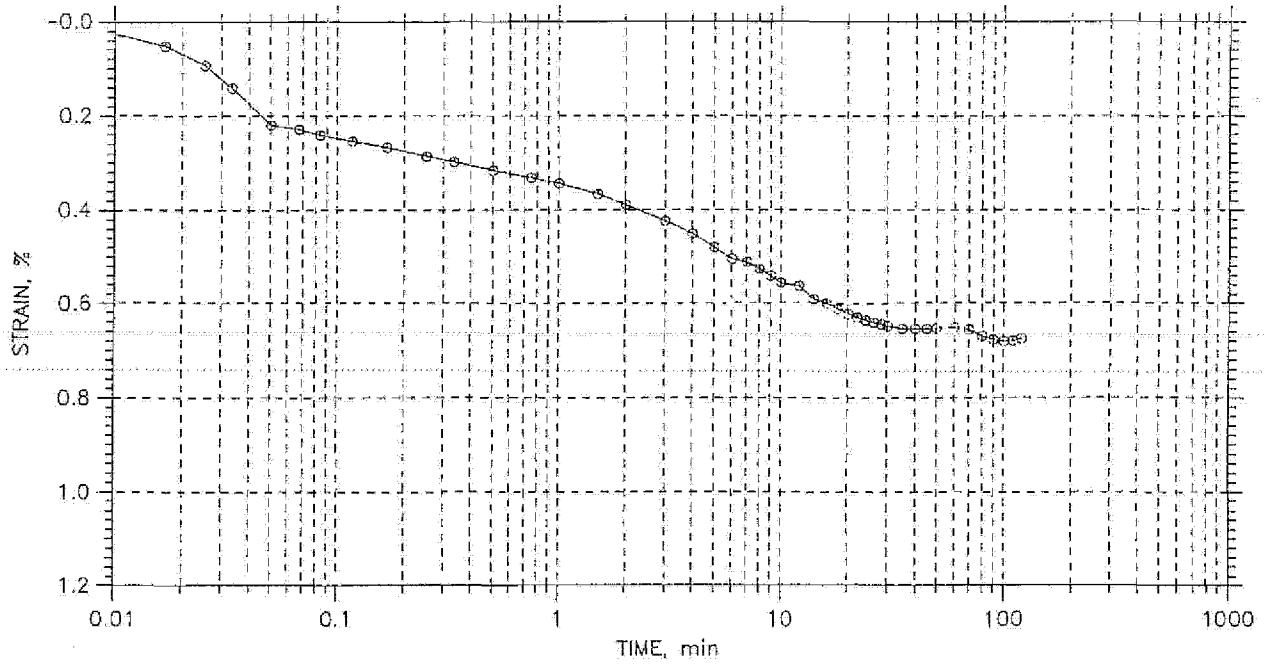
VIL_RESP03643

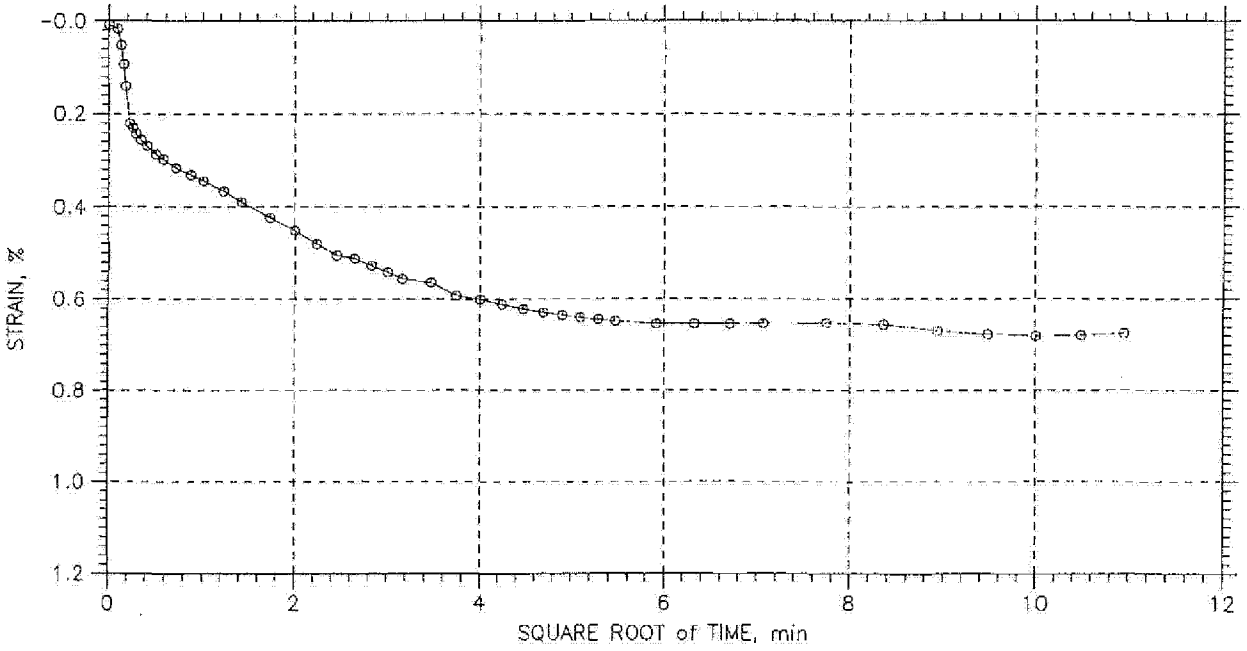
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 1 of 12

Stress: 0.125 tsf





GeoTesting express	Project: No. 064006	Location: Windham, ME	Project No.: GTX-7278
	Boring No.: B-114	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 02/06/07	Depth: 23-25 ft
	Test No.: C-1	Sample Type: Tube	Elevation: ---
	Description: Moist, gray clay with traces of sand		
	Remarks: System G		

VIL_RESP03644

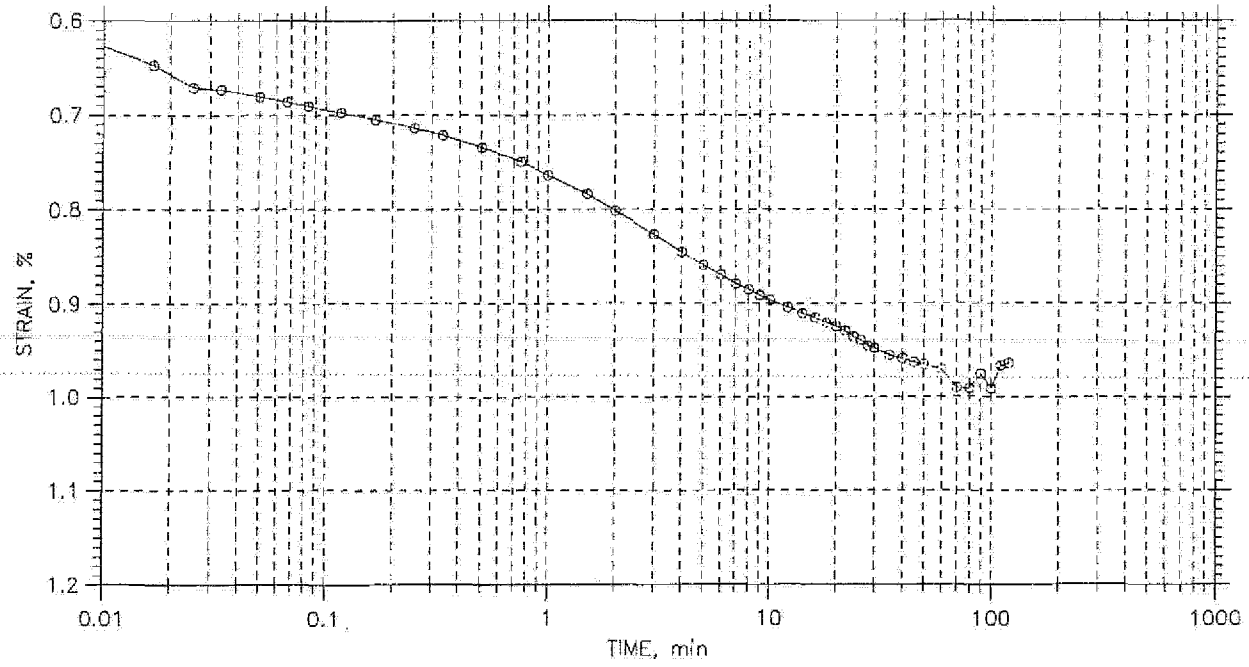
Wed, 14-FEB-2007 13:47:06

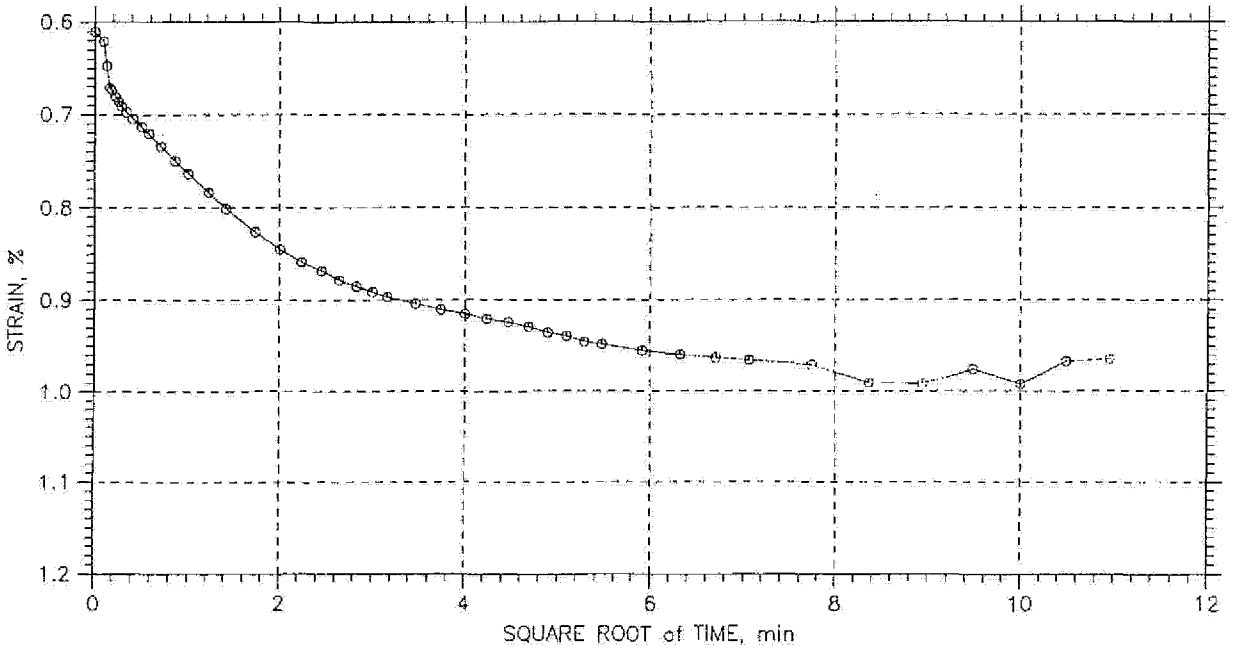
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 2 of 12

Stress: 0.25 tsf





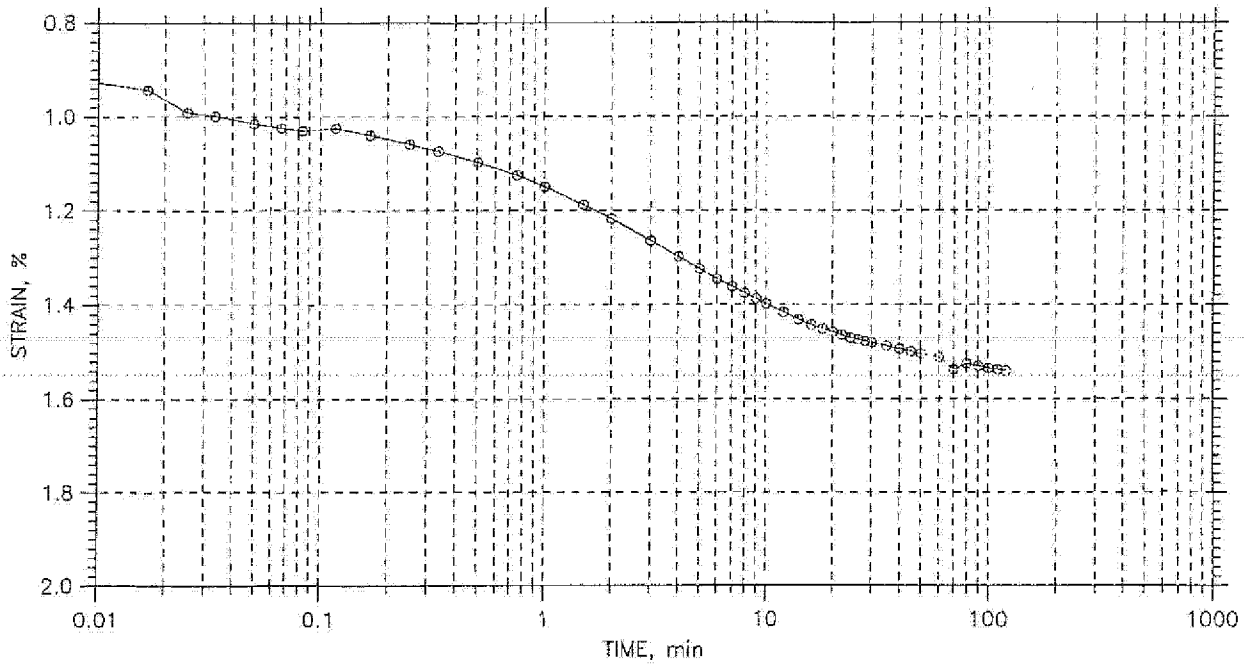
GeoTesting express	Project: No. 064006	Location: Windham, ME	Project No.: GTX-7278
	Boring No.: B-114	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 02/06/07	Depth: 23-25 ft
	Test No.: C-1	Sample Type: Tube	Elevation: ---
	Description: Moist, gray clay with traces of sand		
	Remarks: System G		

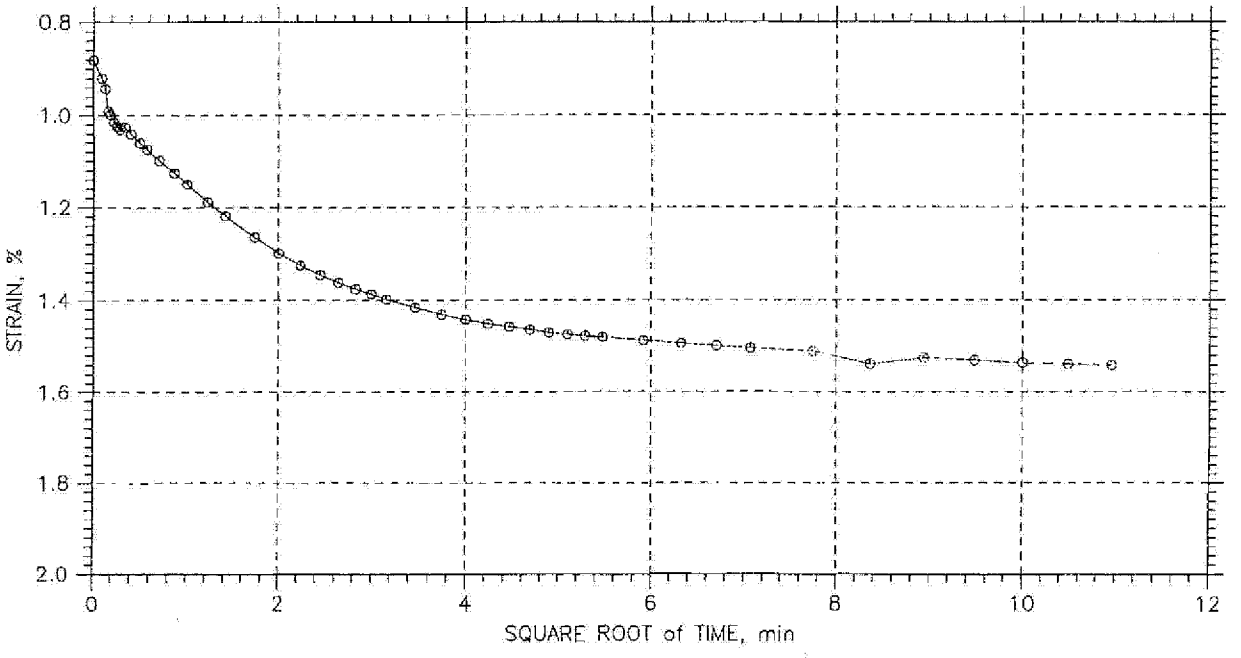
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 3 of 12

Stress: 0.5 tsf





GeoTesting express	Project: No. 064006	Location: Windham, ME	Project No.: GTX-7278
	Boring No.: B-114	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 02/06/07	Depth: 23-25 ft
	Test No.: C-1	Sample Type: Tube	Elevation: ---
	Description: Moist, gray clay with traces of sand		
	Remarks: System G		

VIL_RESP03646

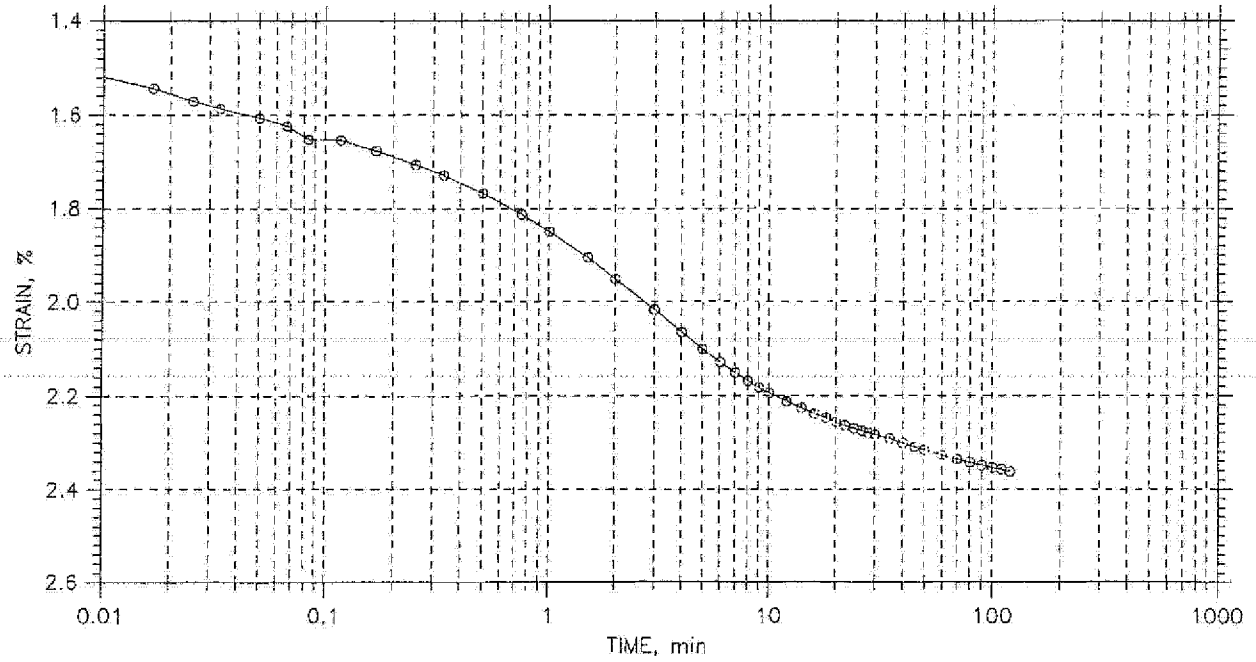
Wed, 14-FEB-2007 13:47:06

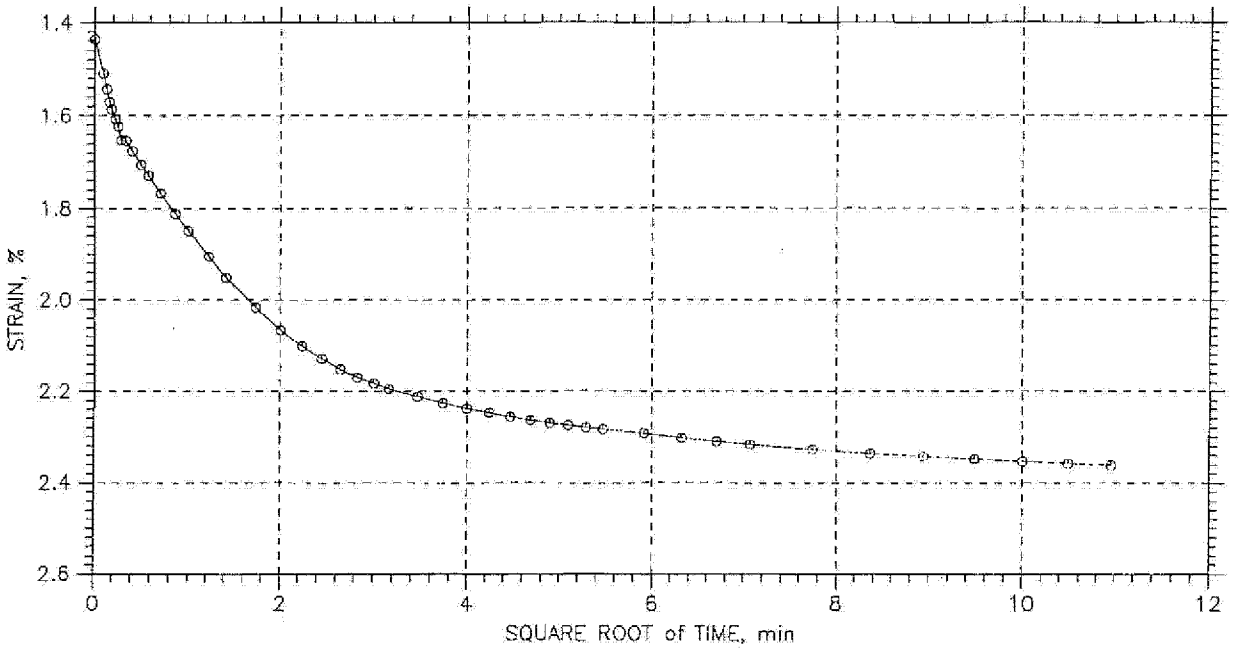
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 4 of 12

Stress: 1. tsf





GeoTesting express	Project: No. 064006	Location: Windham, ME	Project No.: GTX-7278
	Boring No.: B-114	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 02/06/07	Depth: 23-25 ft
	Test No.: C-1	Sample Type: Tube	Elevation: ---
	Description: Moist, gray clay with traces of sand		
	Remarks: System C		

VIL_RESP03647

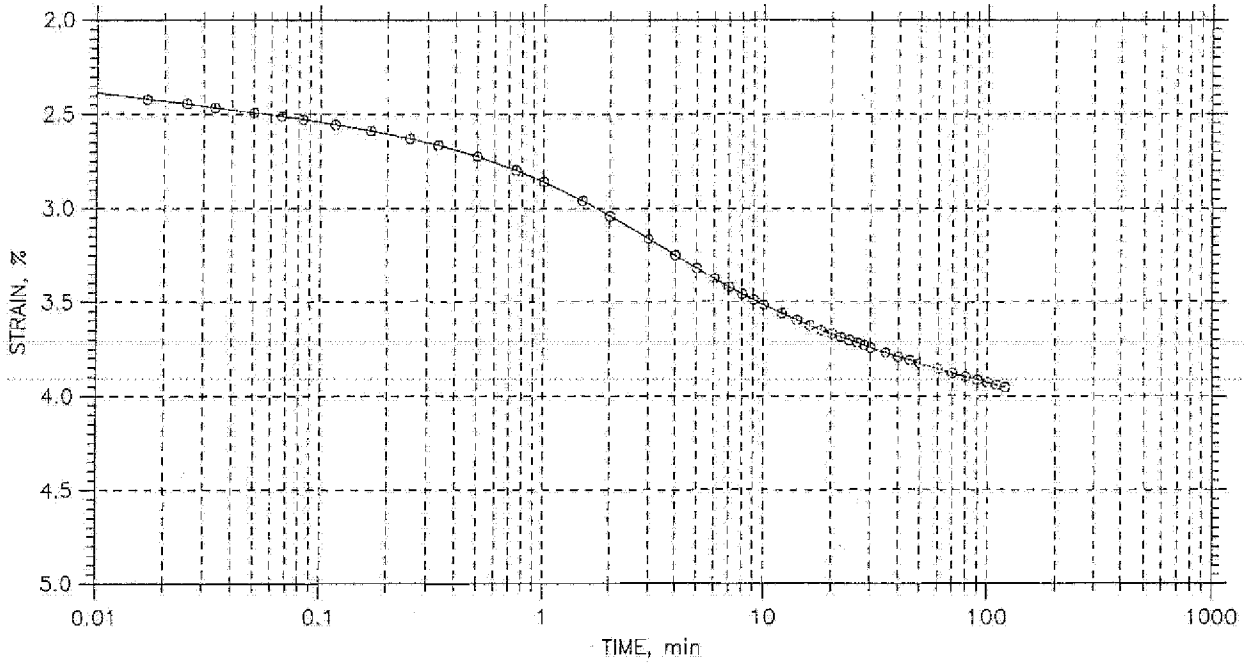
Wed, 14-FEB-2007 13:47:06

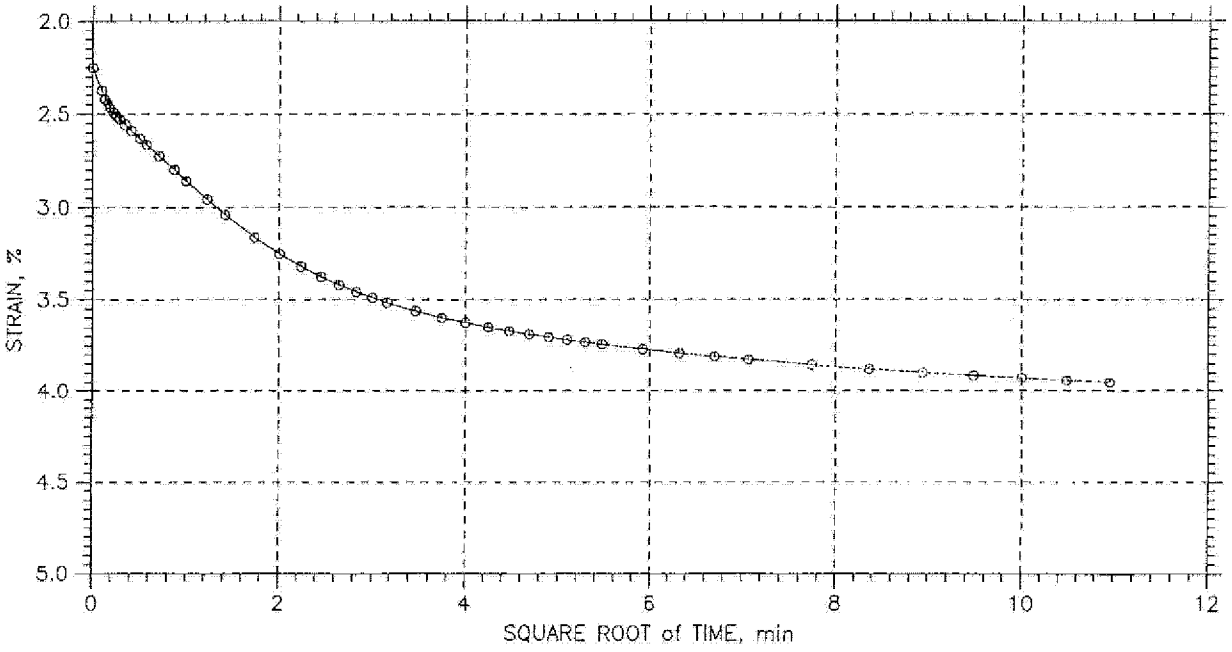
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 5 of 12

Stress: 2. tsf





GeoTesting express	Project: No. 064006	Location: Windham, ME	Project No.: GTX-7278
	Boring No.: B-114	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 02/06/07	Depth: 23-25 ft
	Test No.: C-1	Sample Type: Tube	Elevation: ---
	Description: Moist, gray clay with traces of sand		
	Remarks: System G		

VIL_RESP03648

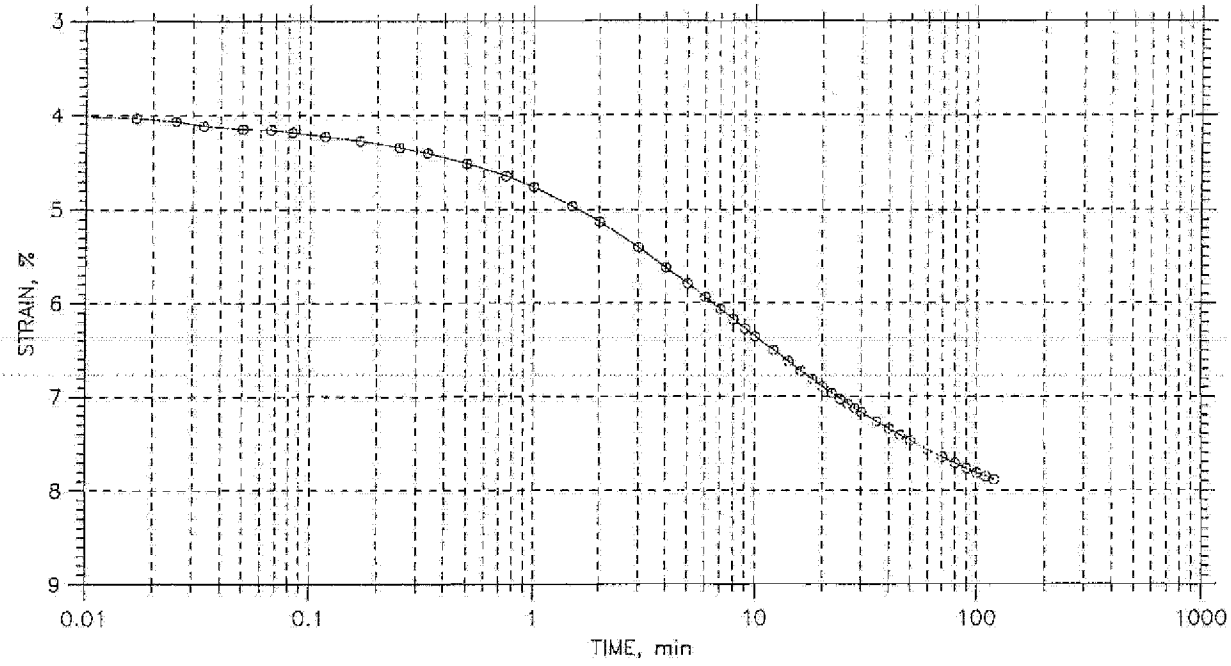
Wed, 14-FEB-2007 13:47:06

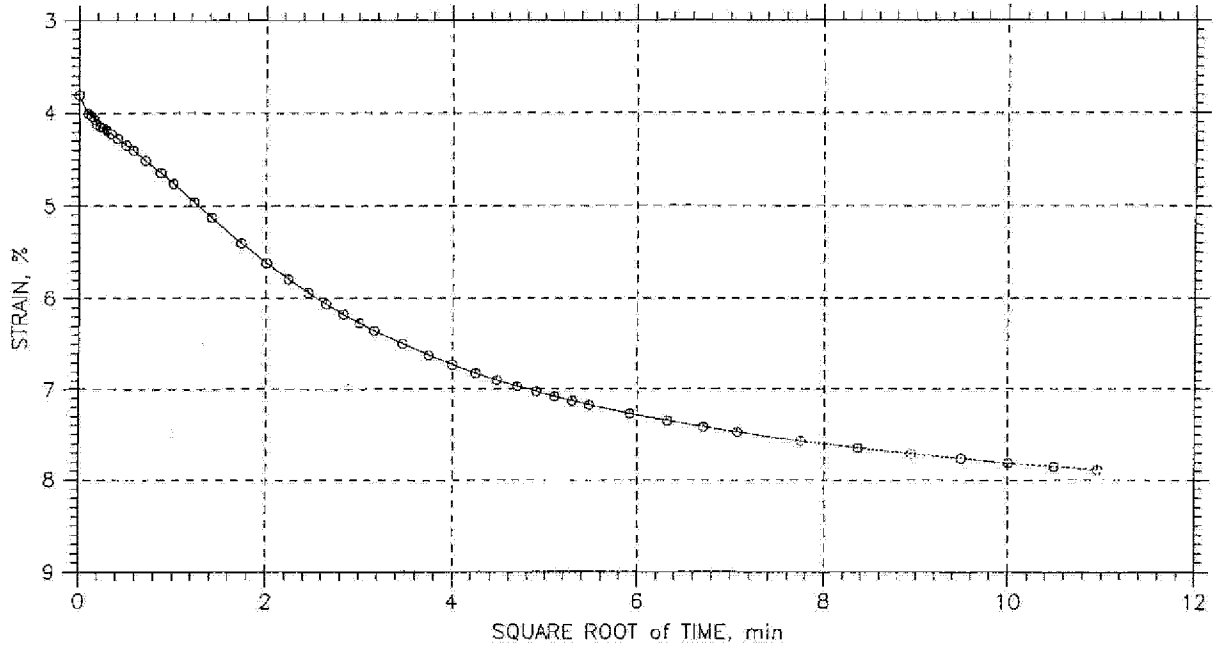
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 6 of 12

Stress: 4. tsf





GeoTesting express	Project: No. 064006	Location: Windham, ME	Project No.: GTX-7278
	Boring No.: B-114	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 02/06/07	Depth: 23-25 ft
	Test No.: C-1	Sample Type: Tube	Elevation: ---
	Description: Moist, gray clay with traces of sand		
	Remarks: System G		

VIL_RESP03649

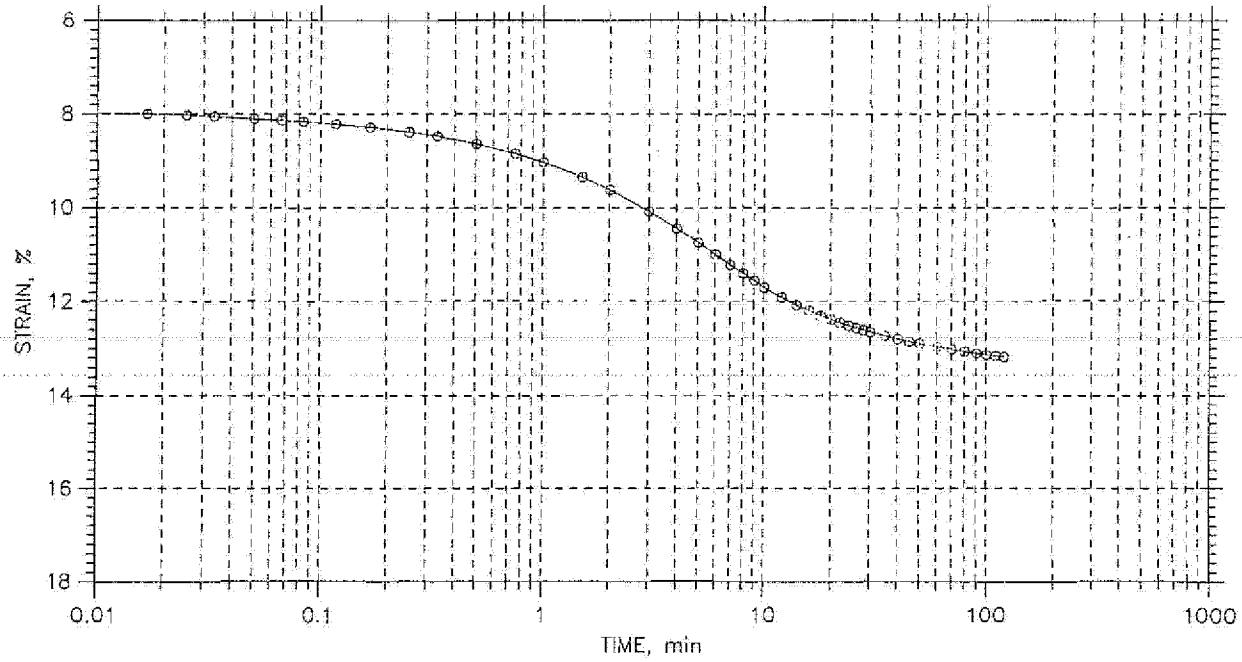
Wed, 14-FEB-2007 13:47:06

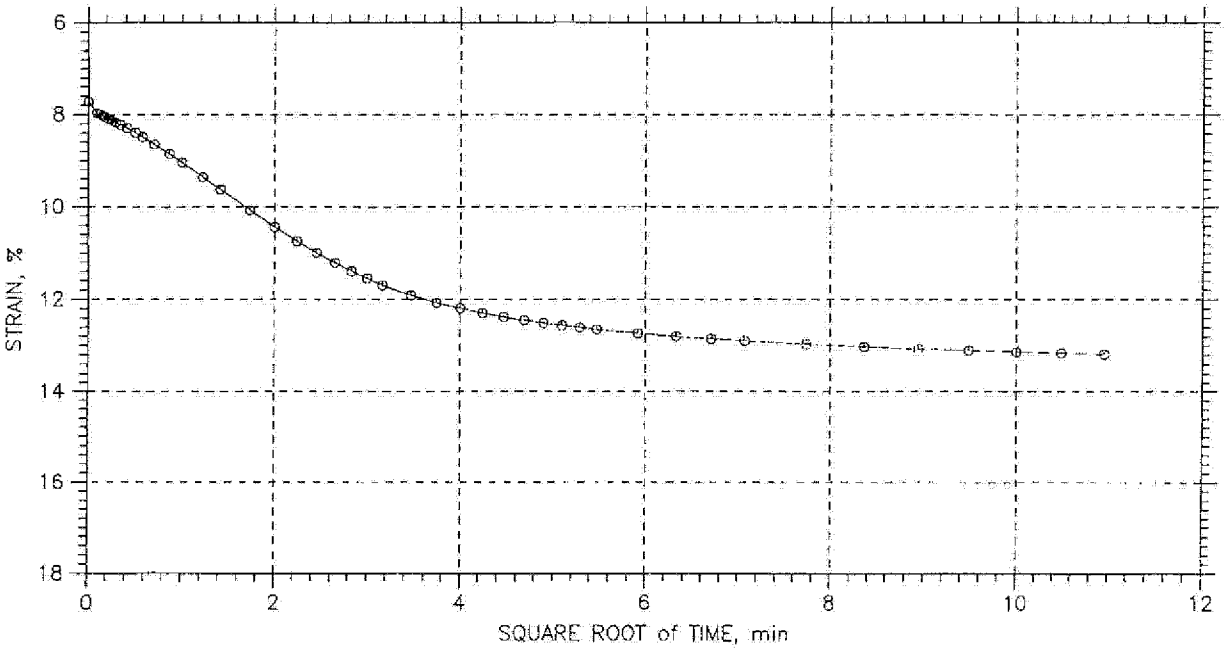
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 7 of 12

Stress: 8. tsf





GeoTesting express	Project: No. 064006	Location: Windham, ME	Project No.: GTX-7278
	Boring No.: B-114	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 02/06/07	Depth: 23-25 ft
	Test No.: C-1	Sample Type: Tube	Elevation: ---
	Description: Moist, gray clay with traces of sand		
	Remarks: System G		

VIL_RESP03650

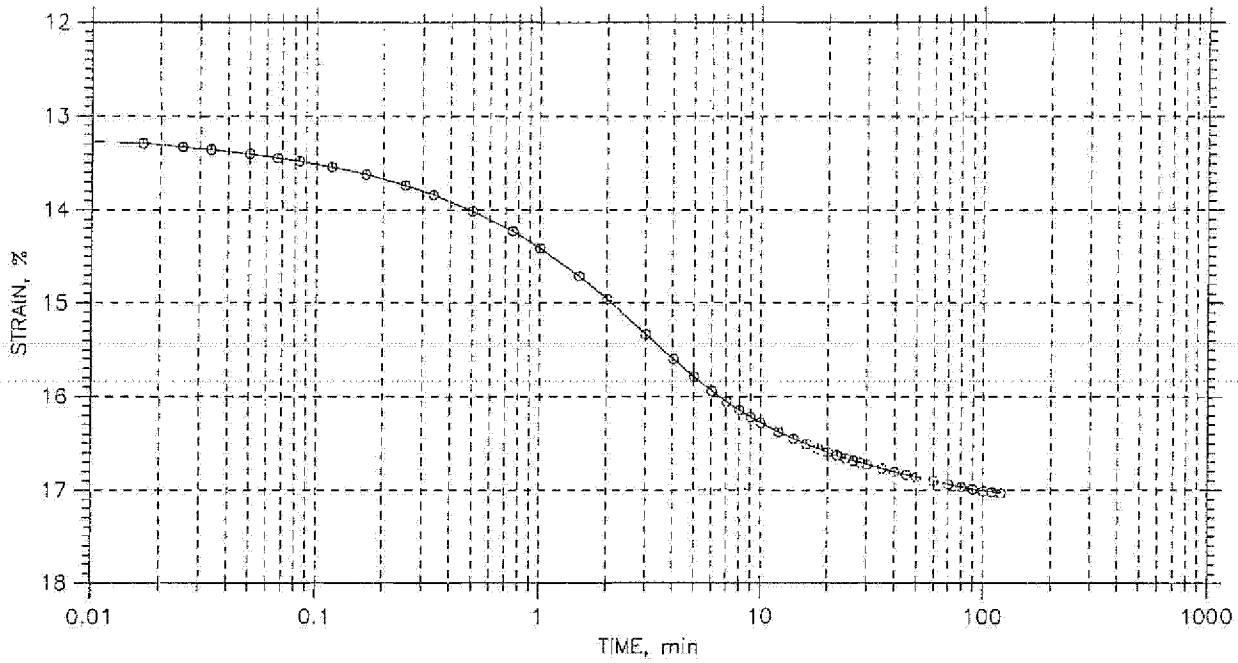
Wed, 14-FEB-2007 13:47:06

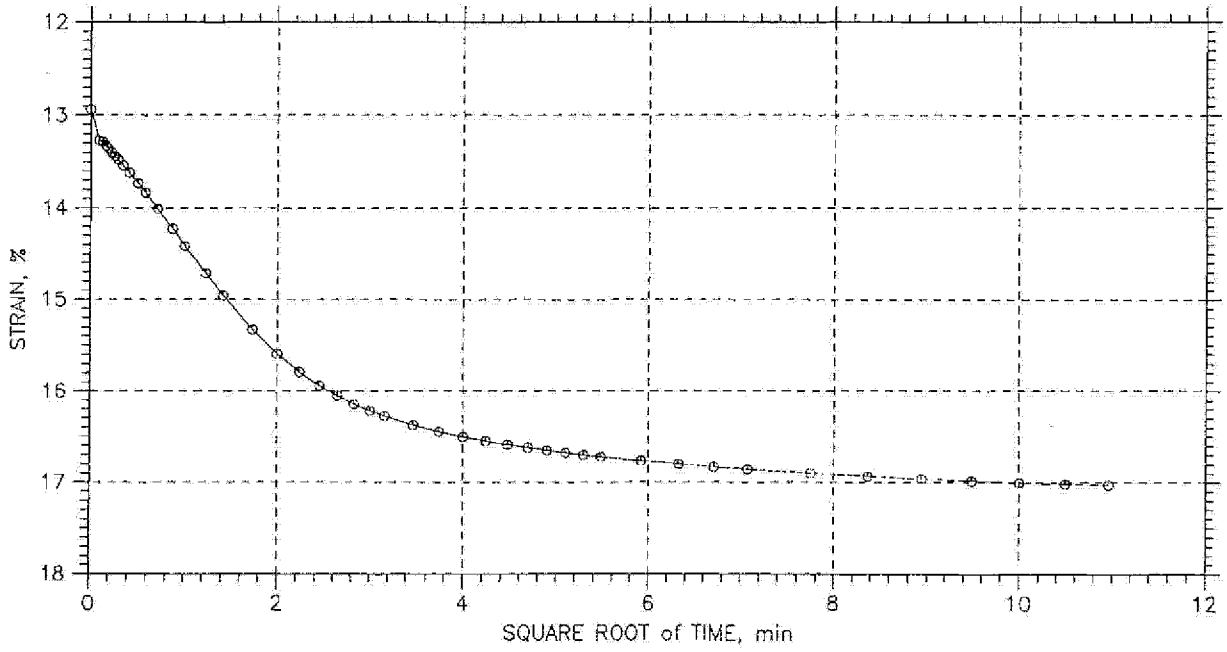
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 8 of 12

Stress: 16. tsf





GeoTesting express	Project: No. 064006	Location: Windham, ME	Project No.: GTX-7278
	Boring No.: B-114	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 02/06/07	Depth: 23-25 ft
	Test No.: C-1	Sample Type: Tube	Elevation: ---
	Description: Moist, gray clay with traces of sand		
	Remarks: System G		

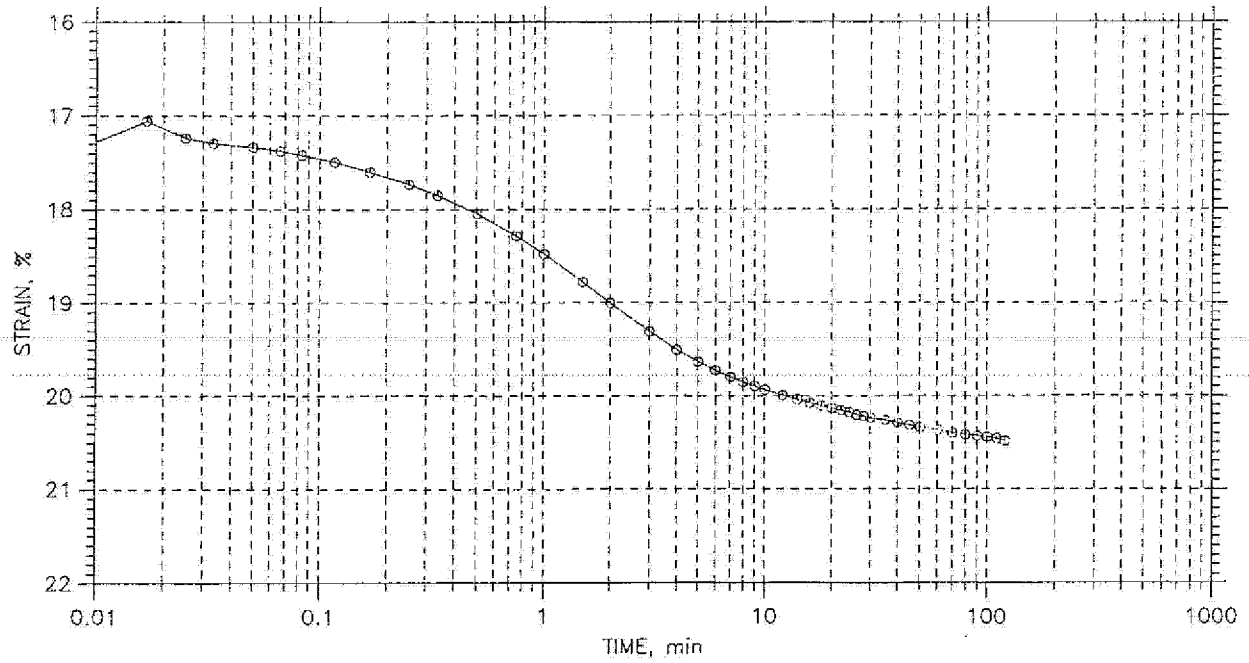
VIL_RESP03651

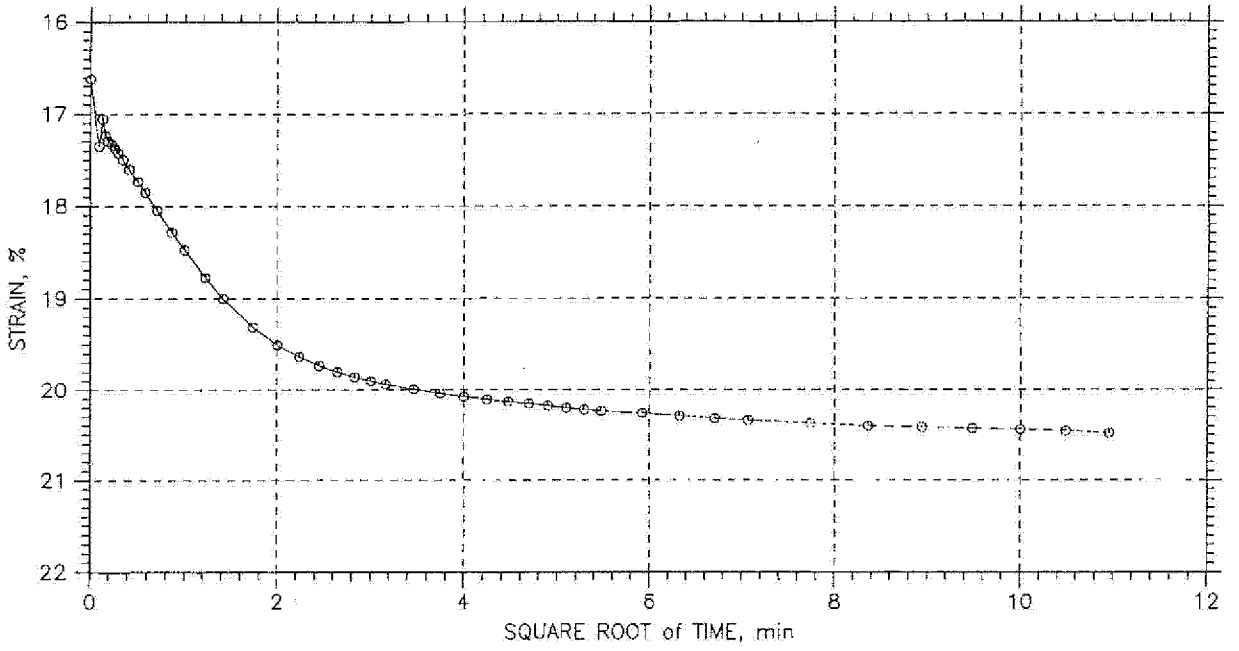
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 9 of 12

Stress: 32. tsf





GeoTesting express	Project: No. 064006	Location: Windham, ME	Project No.: GTX-7278
	Boring No.: B-114	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 02/06/07	Depth: 23-25 ft
	Test No.: C-1	Sample Type: Tube	Elevation: ---
	Description: Moist, gray clay with traces of sand		
	Remarks: System G		

VIL_RESP03652

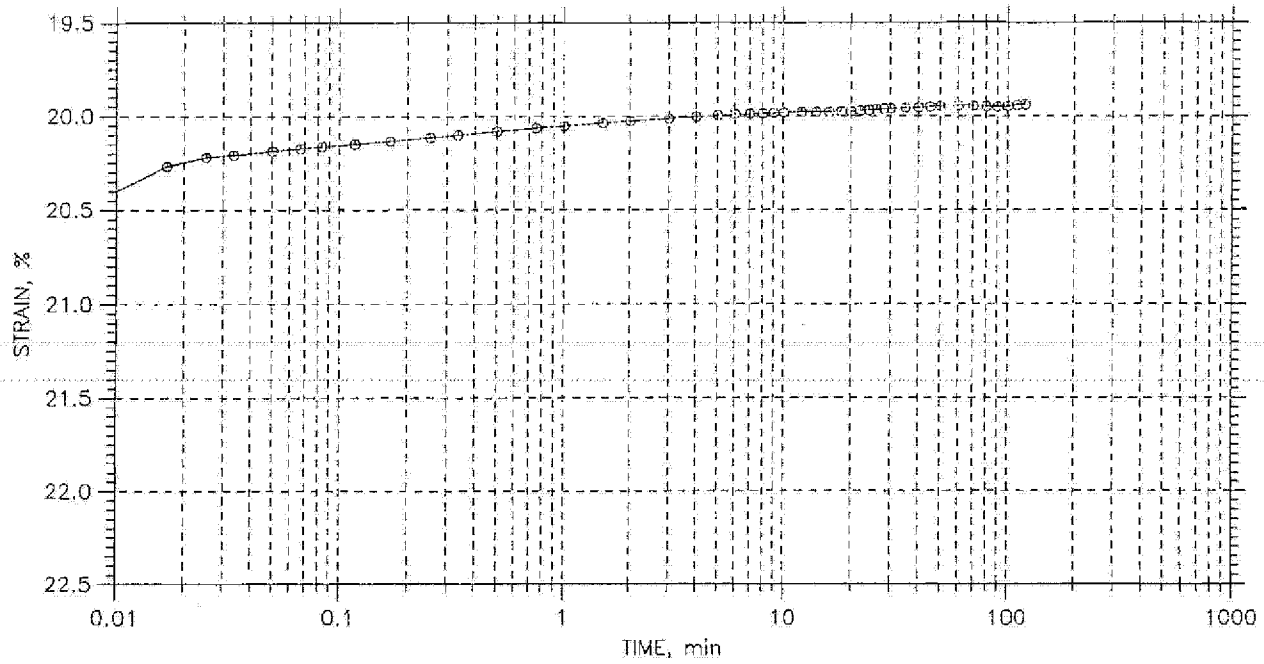
Wed, 14-FEB-2007 13:47:06

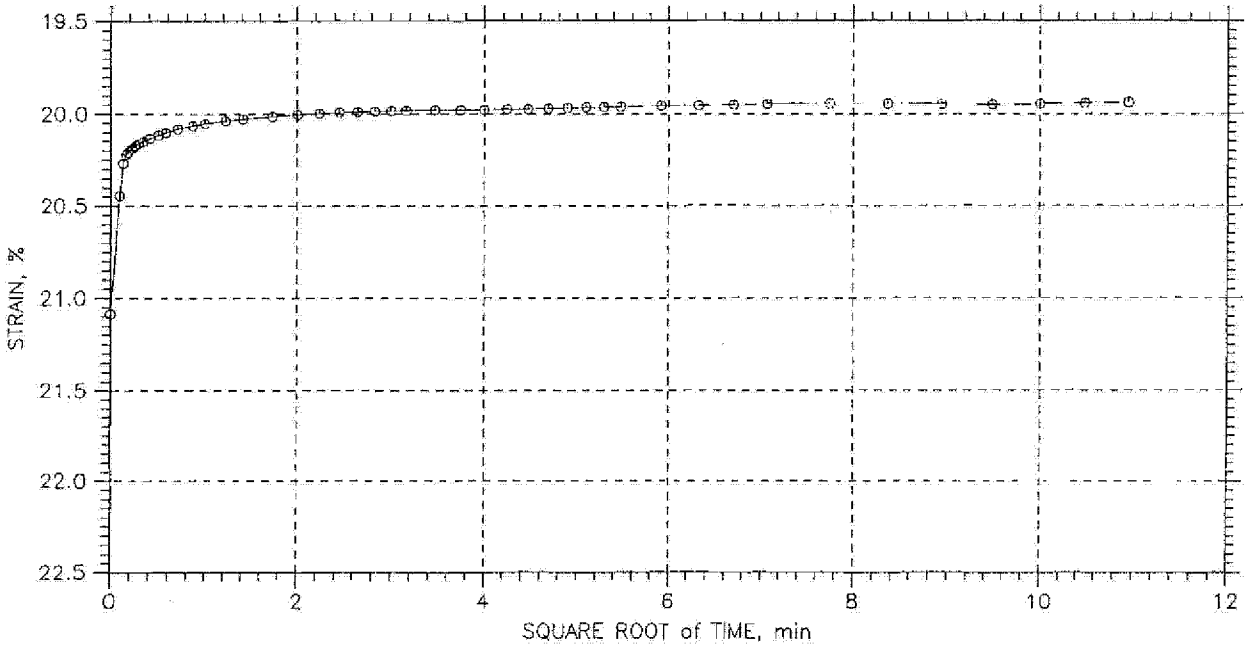
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 10 of 12

Stress: 8. tsf





GeoTesting express	Project: No. 064006	Location: Windham, ME	Project No.: GTX-7278
	Boring No.: B-114	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 02/06/07	Depth: 23-25 ft
	Test No.: C-1	Sample Type: Tube	Elevation: ---
	Description: Moist, gray clay with traces of sand		
	Remarks: System G		

VIL_RESP03653

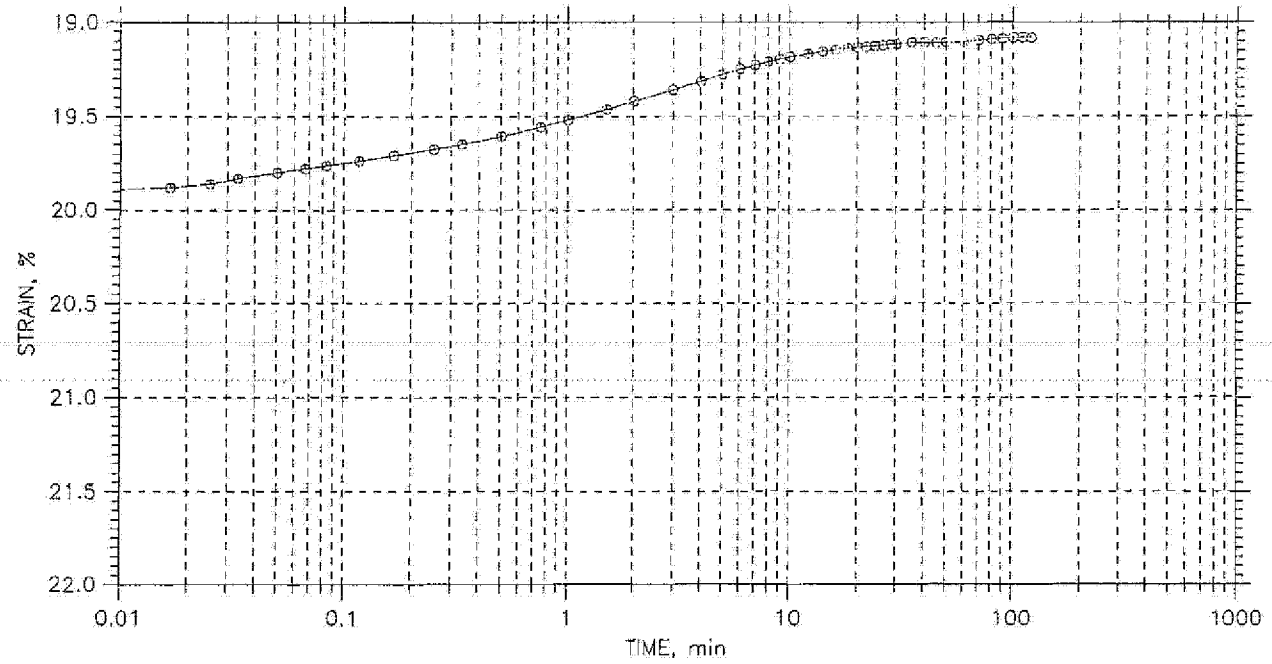
Wed, 14-FEB-2007 13:47:06

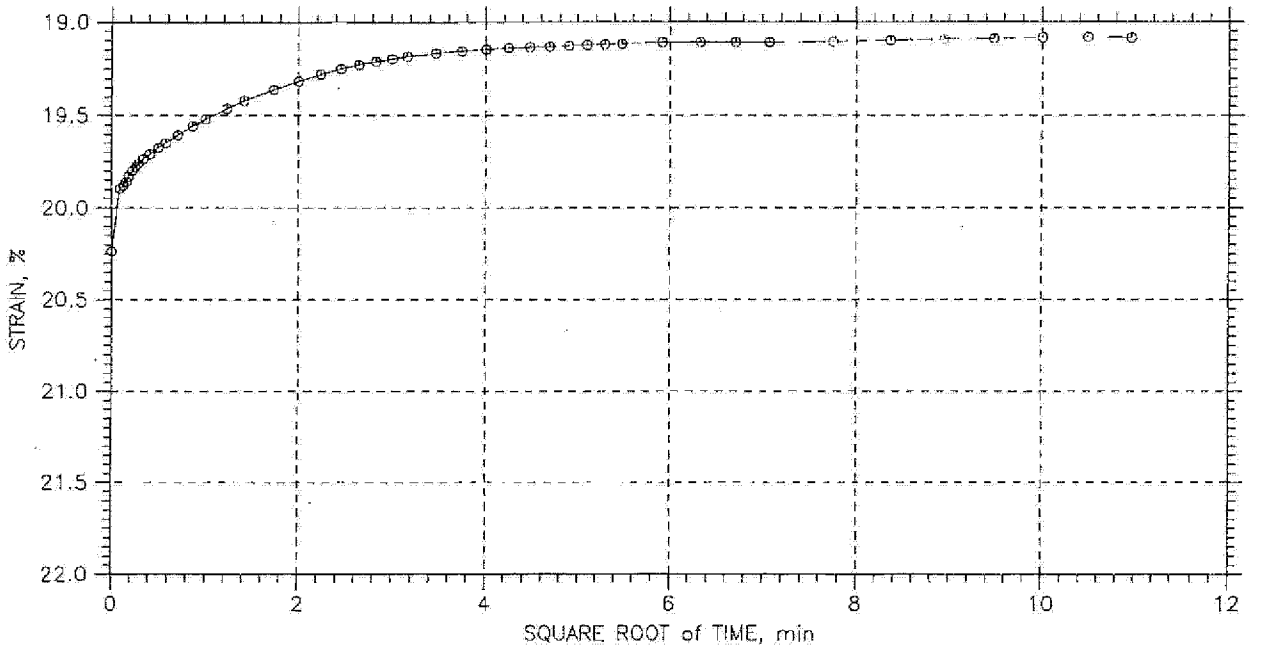
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 11 of 12

Stress: 2. tsf





GeoTesting express	Project: No. 064006	Location: Windham, ME	Project No.: GTX-7278
	Boring No.: B-114	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 02/06/07	Depth: 23-25 ft
	Test No.: C-1	Sample Type: Tube	Elevation: ---
	Description: Moist, gray clay with traces of sand		
	Remarks: System C		

VIL_RESP03654

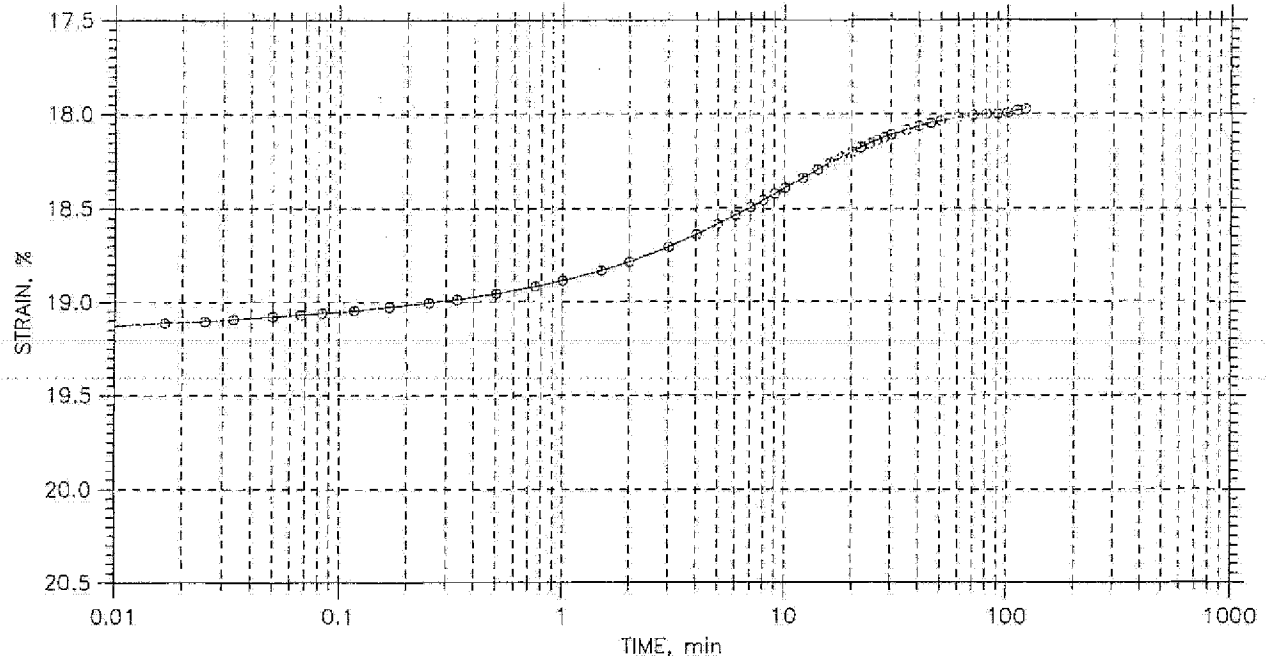
Wed, 14-FEB-2007 13:47:06

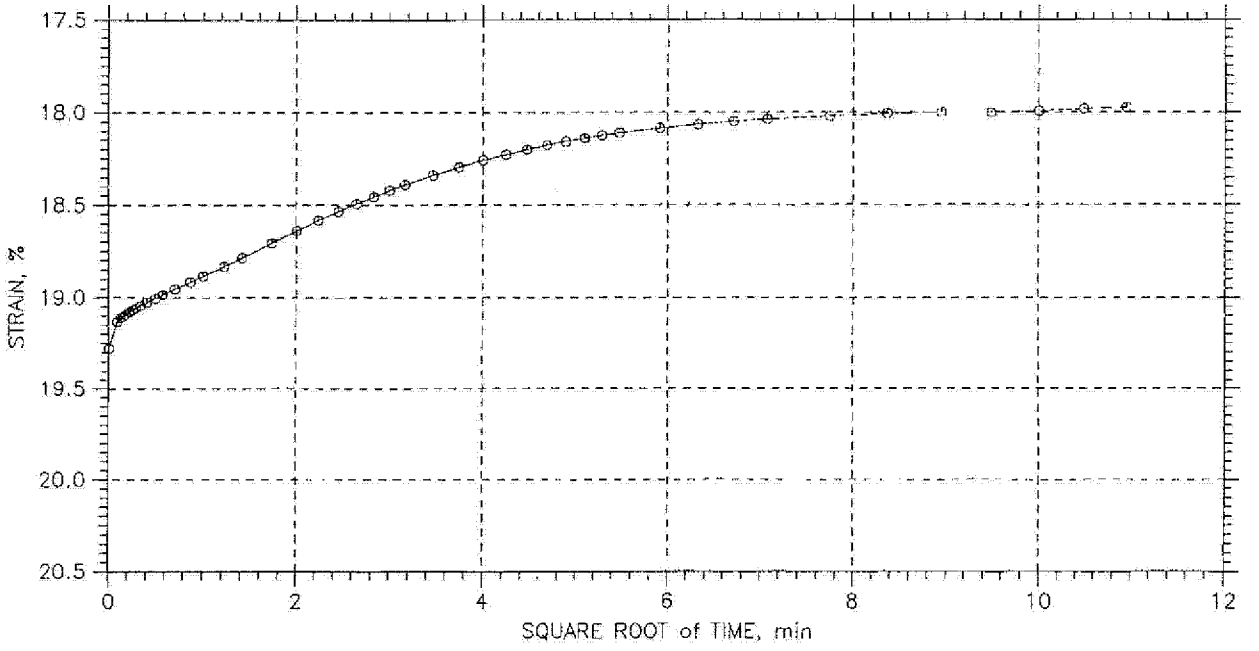
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 12 of 12

Stress: 0.5 tsf





GeoTesting express	Project: No. 084006	Location: Windham, ME	Project No.: GTX-7278
	Boring No.: B-114	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 02/06/07	Depth: 23-25 ft
	Test No.: C-1	Sample Type: Tube	Elevation: ---
	Description: Moist, gray clay with traces of sand		
	Remarks: System G		

VIL_RESP03655

Wed, 14-FEB-2007 13:47:06

CHAIN OF CUSTODY

#20643.53
$200
1 month

GeoTesting Express, Inc.
1145 Massachusetts Avenue
Boxborough, MA 01719
(978) 635-0424 Fax (978) 635-0266

Company Name: OAK ENGINEERS
Address: BADGER'S WHARF
NEWBURYPORT, MA 01950
Contact: WENDELL SHEDD
Phone Number: 978-465-9877
Fax Number: 978-465-2986
Project Name: 064006
Project Location: WENHAM, ME

Sample Type	Container Type
1. Soil	1. Bucket
2. Geosynthetic	2. Bag
3. Rock	3. Jar
4. Concrete	4. Tube
5. Other	5. Roll

Sample Identification	Container Size	Container Type	Sampling Date	Sampling Time	Sample Type	Analysis: CU TEST W/ PORE PRESSURE MEASUREMENTS D4767 CONSOLIDATION TEST W/ 1 CYCLE LOAD UNLOAD	Comments
B114 23'-25'			1/22	11:00 AM	SOIL	X X	~~20~~ 15 PSI CONFINING PRESSURE

Relinquished By: Wendell Shedd	Date: 2/1/07 Time: 10:08AM	Received By:	Date: 2/1/07 Time: 11:00	Special Instructions
Relinquished By:	Date: Time:	Received By:	Date: 2/1/07 Time: 12:00	Rush ____ number of days____
Relinquished By:	Date: Time:	Received By:	Date: Time:	Standard ____ 10 days
SHIPPED VIA:				

VIL_RESP03656

GeoTesting express

WARRANTY and LIABILITY

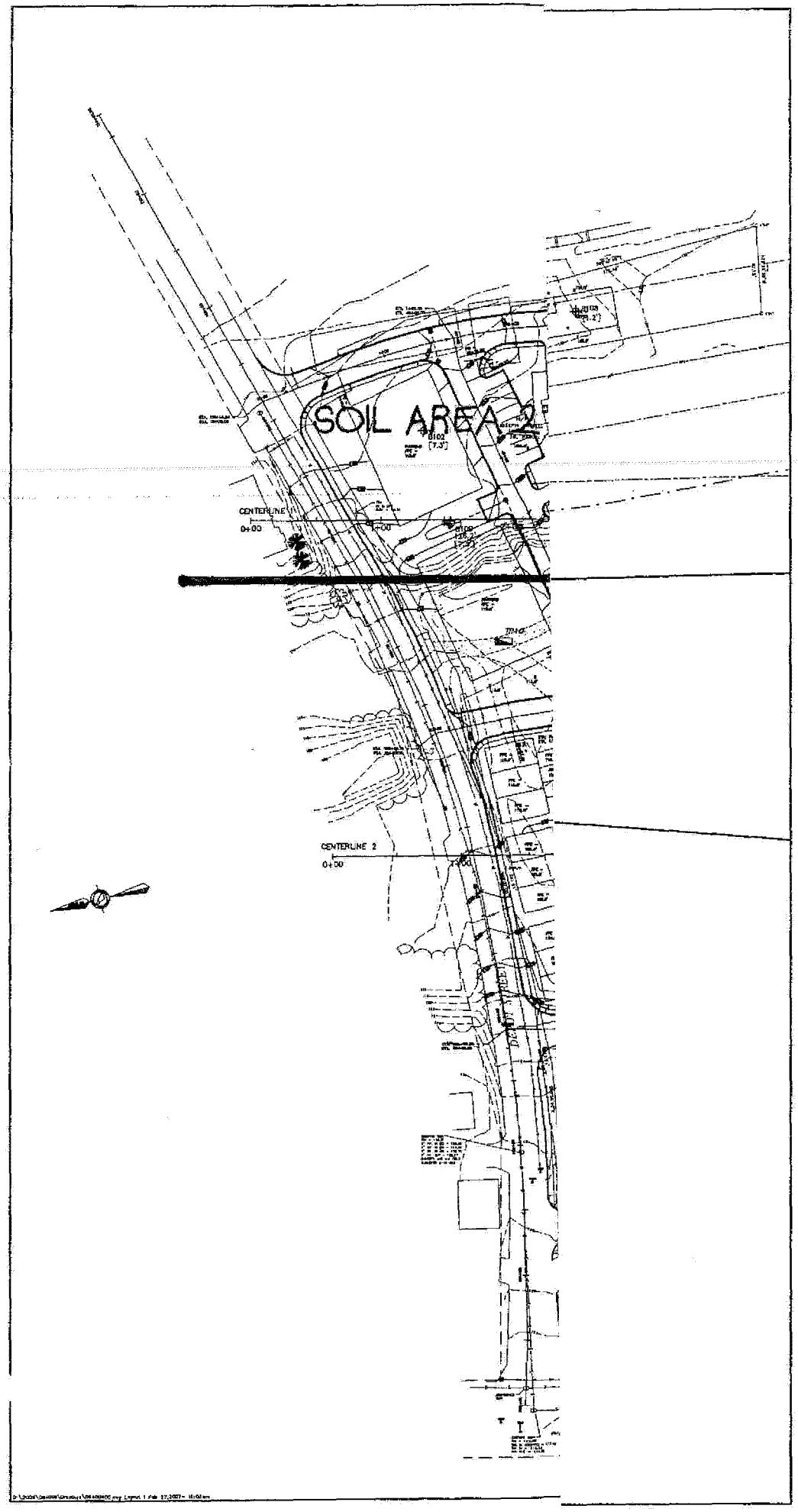
GeoTesting Express (GTX) warrants that all tests it performs are run in general accordance with the specified test procedures and accepted industry practice. GTX will correct or repeat any test that does not comply with this warranty. GTX has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.

GTX may report engineering parameters that require us to interpret the test data. Such parameters are determined using accepted engineering procedures. However, GTX does not warrant that these parameters accurately reflect the true engineering properties of the *in situ* material. Responsibility for interpretation and use of the test data and these parameters for engineering and/or construction purposes rests solely with the user and not with GTX or any of its employees.

GTX's liability will be limited to correcting or repeating a test which fails our warranty. GTX's liability for damages to the Purchaser of testing services for any cause whatsoever shall be limited to the amount GTX received for the testing services. GTX will not be liable for any damages, or for any lost benefits or other consequential damages resulting from the use of these test results, even if GTX has been advised of the possibility of such damages. GTX will not be responsible for any liability of the Purchaser to any third party.

Commonly Used Symbols

A	pore pressure parameter for $\Delta\sigma_1 - \Delta\sigma_3$
B	pore pressure parameter for $\Delta\sigma_3$
CIU	isotropically consolidated undrained triaxial shear test
CR	compression ratio for one dimensional consolidation
C_c	coefficient of curvature, $(D_{30})^2 / (D_{10} \times D_{60})$
C_u	coefficient of uniformity, D_{60}/D_{10}
C_c	compression index for one dimensional consolidation
C_α	coefficient of secondary compression
c_v	coefficient of consolidation
c	cohesion intercept for total stresses
c'	cohesion intercept for effective stresses
D	diameter of specimen
D_{10}	diameter at which 10% of soil is finer
D_{15}	diameter at which 15% of soil is finer
D_{30}	diameter at which 30% of soil is finer
D_{50}	diameter at which 50% of soil is finer
D_{60}	diameter at which 60% of soil is finer
D_{85}	diameter at which 85% of soil is finer
d_{50}	displacement for 50% consolidation
d_{90}	displacement for 90% consolidation
d_{100}	displacement for 100% consolidation
E	Young's modulus
e	void ratio
e_c	void ratio after consolidation
e_o	initial void ratio
G	shear modulus
G_s	specific gravity of soil particles
H	height of specimen
PI	plasticity index
i	gradient
K_o	lateral stress ratio for one dimensional strain
k	permeability
LI	Liquidity Index
m_v	coefficient of volume change
n	porosity
PI	plasticity index
P_c	preconsolidation pressure
p	$(\sigma_1 + \sigma_3) / 2$, $(\sigma_v + \sigma_h) / 2$
p'	$(\sigma'_1 + \sigma'_3) / 2$, $(\sigma'_v + \sigma'_h) / 2$
p'_c	p' at consolidation
Q	quantity of flow
q	$(\sigma_1 - \sigma_3) / 2$
q_f	q at failure
q_o, q_i	initial q
q_c	q at consolidation
S	degree of saturation
SL	shrinkage limit
s_u	undrained shear strength
T	time factor for consolidation
T	temperature
t	time
U, UC	unconfined compression test
UU, Q	unconsolidated undrained triaxial test
u_a	pore gas pressure
u_e	excess pore water pressure
u, u_w	pore water pressure
V	total volume
V_g	volume of gas
V_s	volume of solids
V_v	volume of voids
V_w	volume of water
V_o	initial volume
v	velocity
W	total weight
W_s	weight of solids
W_w	weight of water
w	water content
w_c	water content at consolidation
w_f	final water content
w_l	liquid limit
w_n	natural water content
w_p	plastic limit
w_s	shrinkage limit
w_o, w_i	initial water content
α	slope of q_f versus p_f
α'	slope of q_f versus p_f'
γ_t	total unit weight
γ_d	dry unit weight
γ_s	unit weight of solids
γ_w	unit weight of water
ε	strain
ε_{vol}	volume strain
ε_h, ε_v	horizontal strain, vertical strain
μ	Poisson's ratio, also viscosity
σ	normal stress
σ'	effective normal stress
σ_c, σ'_c	consolidation stress in isotropic stress system
σ_h, σ'_h	horizontal normal stress
σ_v, σ'_v	vertical normal stress
σ_1	major principal stress
σ_2	intermediate principal stress
σ_3	minor principal stress
τ	shear stress
φ	friction angle based on total stresses
φ'	friction angle based on effective stresses
φ'_r	residual friction angle
φ_{ult}	φ for ultimate strength



Site:

VILLAGE AT LITTLE FALLS

13 DEPOT STREET
SOUTH WINDHAM, MAINE

Prepared for:

NORTHEAST CIVIL SOLUTIONS
153 US ROUTE 1
SCARBOROUGH, ME 04074

0 25 50 100
SCALE in FEET
1"=50'

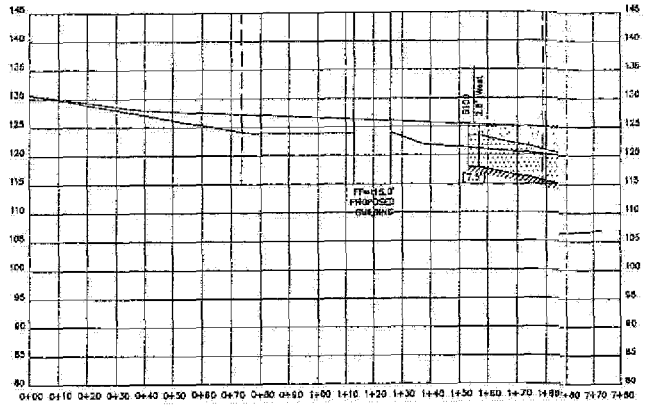
OAK ENGINEERS
Brown's Wharf
Newburyport, MA 01950
Tel. (978) 463-9877
Fax (978) 463-9986
www.oakengineers.com

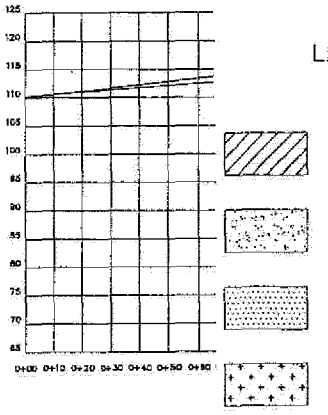
SITE PLAN

No.	Revision/Issue	Date

Designed by: DEG	Checked by: PDD
Drawn by: DEF	Approved by: PDD
Project: 064006	Date: FEBRUARY 2007
Sheet: C1	

VIL_RESP03658





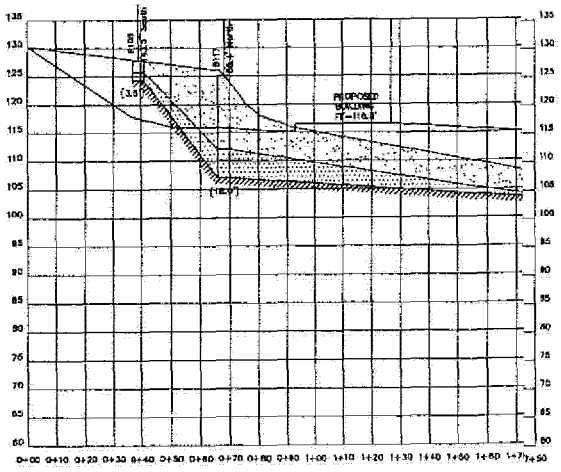
LEGEND

APPARENT BEDROCK

SILTY SAND/FILL

CLAY/SILT

ORGANICS



Site:

VILLAGE AT LITTLE FALLS

13 DEPOT STREET
SOUTH WINDHAM, MAINE

Prepared for:

NORTHEAST CIVIL SOLUTIONS
153 US ROUTE 1
SCARBOROUGH, ME 04074

VERTICAL SCALE
0 30 60 120
SCALE in FEET
1"=60'

HORIZONTAL SCALE
0 15 30 60
SCALE in FEET
1"=30'

OAK ENGINEERS
Brown's Wharf
Newburyport, MA 01950
Tel. (978) 463-9877
Fax (978) 463-2980
www.oakengineers.com

APPARENT SUBSURFACE PROFILES

No.	Revision/Issue	Date

Design by: DEG	Checked by: PDD
Drawn by: DEG	Approved by: PDD
Project: 054006	Date: FEBRUARY 2007
Sheet: C2	

VIL_RESP03659

SECTION 12

STORMWATER MANAGEMENT

A. Narrative
See the attached Stormwater Management Report for the Stormwater Management Narrative

B. Map
Please refer to Appendix K of the Stormwater Management Report for a USGS map of the proposed development and a copy of the Soil Survey Map.

C. Drainage Plans
Please refer to the attached plan set for a copy of the Pre-Development and Post-Development Drainage Plans.

D. Runoff Analysis
See the attached Stormwater Management Report for Stormwater Discharge Calculations

E. Stormwater Quantity Control Plan
Please refer to the Erosion Control Plan in the attached planset and the Erosion Control Report in Section 14.

F. Stormwater Quality Treatment Plan
Please refer to the attached Stormwater Management Report for Stormwater Drainage Management Plan and Stormwater Quality Calculations.

STORMWATER MANAGEMENT REPORT

VILLAGE AT LITTLE FALLS

Route 202
Tax Map 38, Parcels 6&7
Windham, Maine

Prepared For:
HRC – Village at Little Falls, LLC
2 Market Street
Portland, Maine 04101

March 2007

Prepared by:
Northeast Civil Solutions, Inc.
153 U.S. Route 1
Scarborough, ME 04074

29522

VIL_RESP03662

TABLE OF CONTENTS

APPENDICES

1. INTRODUCTION

The proposed Village at Little Falls development consists of 85 new residential condominium units with associated paved streets, landscaping, driveways, utilities, and stormwater management infrastructure. The project will include two 12-unit apartment buildings, nine duplexes, nine porch style units, 33 townhouse units, and a single-family residence. The 8.03-acre property is located in Windham, Maine at the corner of Route 202 and Depot Street. The property has approximately 370 feet of frontage on the Presumpscot River.

The site formerly housed a pulp mill that was later transformed into a steel mill. The mill was abandoned in the late 1980's; and currently, the mill is in a state of disrepair. The mill is located along the Presumpscot River and is constructed on a pile type foundation to allow the river to flow under the western end of the building. It is speculated that this end of the building originally housed a turbine to generate its own electricity. Just to the east of the project site lies the rail bed of the Maine Central Railroad, tracks and ties were removed approximately 1 year ago. A cross culvert discharges flow onto the site near the intersection of the rail bed with Depot Street. The discharge from this culvert has formed a man-made channel that meanders 300' through the site before disappearing below grade. It is believed that the channel flows beneath the mill before discharging into the Presumpscot River. The Presumpscot River is not an urban impaired stream. The proposed project is required to meet the DEP's Basic, General, and Flooding Standards.

2. STUDY METHODOLOGY

In this study, the Soil Conservation Services Urban Hydrology for Small watersheds, Technical Release 20 (also known as SCS-TR20) was utilized to model the surface water drainage patterns for the pre and post development drainage conditions. HydroCAD Stormwater Modeling System Software (Version 6) was used for the SCS TR20 calculations. The SCS TR-55 method was used to estimate the Time of Concentration (Tc). This method involves estimating the length of sheet flow, shallow concentrated flow and channel flow that occurs within each subcatchment. Each Tc Path and corresponding length and slope is identified in the pre and post development drainage area plan. From this information, the time of concentration is determined for each watershed. Modeling was conducted using the 2, 10, and 25-year storm events.

The curve numbers (CN) utilized in this analysis relate to the ground cover that was observed on the site. The following curve numbers were used.

Table 1 – Summary of Curve Numbers

Description	Hyd B	Hyd C	Hyd D
Pavement/Roofs	98	98	98
Pasture/Grass, Fair	69	79	84
Pasture/Grass, Good	61	74	80
Brush, Good	56	65	73

The proposed closed drainage system was designed using Heasted Method's StormCAD software. StormCAD utilizes the Rational Method to calculate runoff rates to each catch basin. Manning's Equation is used to calculate pipe flow properties. The closed drainage system was designed using a 10-year storm. The subcatchment areas and associated Rational Method coefficients are shown on the attached Pipe Sizing Plan. The Rational Method Calculations are included in Appendix A.

3. Off-Site Drainage

Two existing culverts discharge stormwater from abutting properties onto the project site. An 18" corrugated metal pipe provides drainage for the eastern abutter. Similarly, the output from an abutting underground detention system flows onto the site near the western boundary. In both cases, the stormwater was directed into the development's proposed catchbasin system.

The offsite subcatchment for the eastern abutter was calculated based upon USGS Topographical maps for the area. A copy of this map with the subcatchment delineation is provided in Appendix B. The stormwater flow from this subcatchment is directed into an existing 18" stormwater culvert. The maximum flow capacity of this culvert was calculated based upon Manning's Equation. A copy of the capacity calculation is attached in Appendix B. This maximum flow capacity of the pipe was incorporated into the HydroCAD and StormCAD models.

The stormwater discharge from the abutting Little Falls Landing apartment building is also included in the system modeling calculations. The previously approved HydroCAD model for the abutter's existing drainage system was included in the attached model for the Village at Little Falls project. The flow from this system is less than 0.5 cfs and therefore does not have a significant impact on the proposed development.

4. Pre-Development Conditions

Soil boundaries were taken from the Cumberland County SCS Soil Maps. The following soils were encountered on the site:

- Cu – Undorthents – Hydrologic Soil Group C
- HrB – Hollis Fine Sandy Loam – Hydrologic Soil Group C
- Py – Podunk Fine Sandy Loam – Hydrologic Soil Group B
- HfD2 – Hartland Very Fine Sandy Loam – Hydrologic Soil Group B
- Sn – Scantic Silt Loam – Hydrologic Soil Group D

Under pre-development conditions the site is modeled as a single drainage area. Additional information regarding this subcatchment is shown on the attached Pre-Development Drainage Plan.

The Pre-Development Drainage Area encompasses approximately 8.96 acres and is composed of gravel drives, pavement, roofs, and grass. Water drains towards the southwest, under the western portion of the mill and into the Presumpscot River.

Table 2, found below summarizes the Pre-Development flow that is discharged from this site during the 2, 10, and 25-year storm events. Please refer to Appendix C for HydroCAD calculations of the Pre-Development discharge rates.

Table 2 – Summary of Pre-Development Discharges

Analysis Point	HydroCAD Node	Discharges (cfs)		
		Q_2	Q_{10}	Q_{25}
1	1L	14.0	26.4	32.6

5. Post Development Conditions

The proposed development results in the addition 2.8 acres of impervious area to the site. Due to the increase in impervious areas the peak flow of runoff also increases. However, the proposed underground detention system will offset this increase. Consequently, Post-Development drainage rates are equal to or less than the existing discharge rates. Under Post Development conditions, the site is broken into two drainage areas.

Drainage Area V1
This area is approximately 6.5 acres in size and is comprised of pavement, roofs, and lawn. Stormwater drains along the curbline and into the existing catchbasin system. The discharge from the catchbasin system is filtered and cooled in the underground storage and treatment system prior to discharge into the Presumpscot River.

Drainage Area V2
This area is approximately 2.5 acres in size and is located along the shore of the Presumpscot River. This shoreline will be restored to a natural vegetative state after the removal of the mill building. Stormwater flows southwest into the river.

Table 3, found below summarizes the Post-Development flow that is discharged from this site during the 2, 10, and 25-year storm events. Please refer to Appendix C for HydroCAD calculations of the Post-Development discharge rates.

Table 3 – Summary of Post Development Discharges with Storage

Analysis Point	HydroCAD Node	Discharges (cfs)		
		Q_2	Q_{10}	Q_{25}
1	1L	11.6	26.1	32.4

The following table compares the total pre-development flows to the post development discharge for the 2, 10, and 25-year storm events.

Table 4 – Comparison of Pre and Post Development Discharges for Analysis Point 1

Return Period	Point 1 Pre Flows (cfs)	Point 1 Post Flows (cfs)	Diff. (cfs)
2	14.0	11.6	-2.4
10	26.4	26.1	-0.4
25	32.6	32.4	-0.2

By examination of the above table, all post development discharge rates are less than or equal to the pre-development rates.

6. GENERAL STANDARD BMP REQUIREMENTS

After the proposed development, the total imperious area onsite will be approximately 4.24 acres, the total developed area will be approximately 7.32 acres, and the total disturbed area will be approximately 7.6 acres. The lot size is approximately 8.03 acres.

The following table summarizes the stormwater control requirements for the proposed development.

Table 5– Summary of Control Requirements

Area Type	Total Area on Site	Area Controlled by Structural Measures	% Area Controlled
Impervious	184,593 sqft	176,891 sqft	95%
Developed	318,777 sqft	254,621 sqft	80%

The DEP General Standards require that 95% of the impervious area and 80% of the developed area be treated. By examination of Table 5, the proposed treatment system will satisfy both of these requirements. Please refer to Appendix D for treatment level calculations and plans.

The stormwater from the proposed development will be filtered and cooled prior to discharge into the Presumpscot River. The filtration will take place in three precast concrete vaults that house 27 Contech Stormfilter Cartridges each. These Stormfilters are designed to remove a wide range of pollutants, including total suspended solids (TSS), soluble heavy metals, oil, grease, and total nutrients. Contech has preformed several field tests on the Stormfilter system with successful results. The test data will be forwarded directly to Jeff Dennis for review and approval of the Stormfilter Technology.

Prior to filtration, stormwater will be detained in an underground detention system. The system flow time is 24 hours. Therefore, the water will be adequately cooled prior to discharge into the river.

The proposed treatment system was sized based on a 1" runoff from the impervious areas and a 0.4" runoff from landscaped areas. The volume and duration calculations for the treatment system are included in Appendix E.

The number of cartridges required was based upon a flow rate of 2 gpm per cartridge. A total of 81 cartridges will be required. Please refer to Appendix F for Filter Cartridge calculations.

Riprap is proposed at the discharge of the treatment system in order to protect the area from erosion. The riprap will have a D_{50} size of 6". The outlet protection calculations are included in Appendix H. Details of the outlet protection areas are included in the attached planset.

7. Maintenance Plan

A Homeowners Association will be responsible for the maintenance of all stormwater management structures, the establishment of any contract services required, and the keeping of records and maintenance logbook. The contract with Clean Harbors is included in Appendix I. At a minimum, the appropriate and relevant activities for each of the stormwater management facilities will be performed on the prescribed schedule.

A sample of the Maintenance Log is included in Appendix J. Records of all inspections and maintenance work accomplished must be kept on file and retained for a minimum 5-year time span. The maintenance logbook shall be made available to the DEP upon request.

Sweeping

Paved surfaces shall be swept or vacuumed at least twice annually in the spring to remove all winter sand, and periodically during the year on an as-needed basis to minimize transportation of sediment during rainfall events.

Closed Drainage Structures, Catchbasins and Outlet Control Structures

Catch basins sumps shall be inspected in the spring and periodically during the year on an as-needed basis. If the catch basin sump is filled, remove sediment via a vacuum truck or any mechanical means. Care should be taken to not flush the sediments into the underdrain soil filters or retention systems as it will reduce the system's capacity and hasten the time when it must be cleaned.

If sediment in culverts or piped drainage systems exceeds 20% of the diameter of the pipe, it should be removed. This may be accomplished by hydraulic flushing or any mechanical means. All pipes should be inspected on an annual basis.

Underground Detention System

The underground detention system will need to be inspected annually, with the initial inspection occurring 6 months after installation. If sediment is found during the visual inspection, a stadia rod should be inserted to determine the depth of sediment. If the

depth of sediment exceeds 3 inches, the system should be cleaned using a vacuum process.

Stormfilters

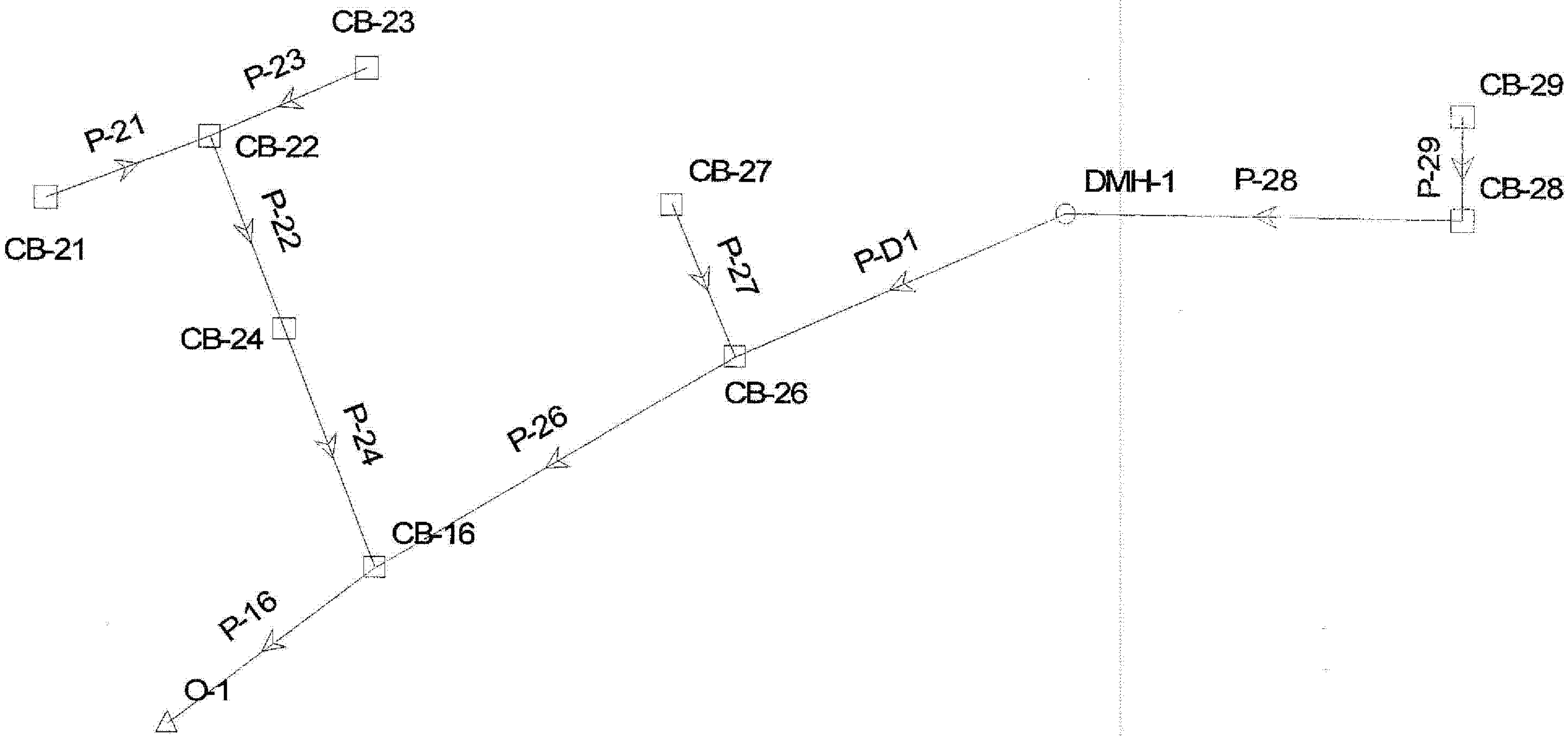
The Stormfilters will be inspected after every major storm event and at least once every six months. Any trash or debris should be removed during the inspection. If the filter cartridges become clogged, they should be removed and replaced with clean cartridge units. Sedimentation should be removed from the vault via a vacuum processes.

The maintenance requirements outlined in this report are incorporated into the development's homeowners association documentation. Please refer to Appendix L for a copy of the condominium documentation.

Appendix A

Pipe Sizing Calculations

Scenario: Base

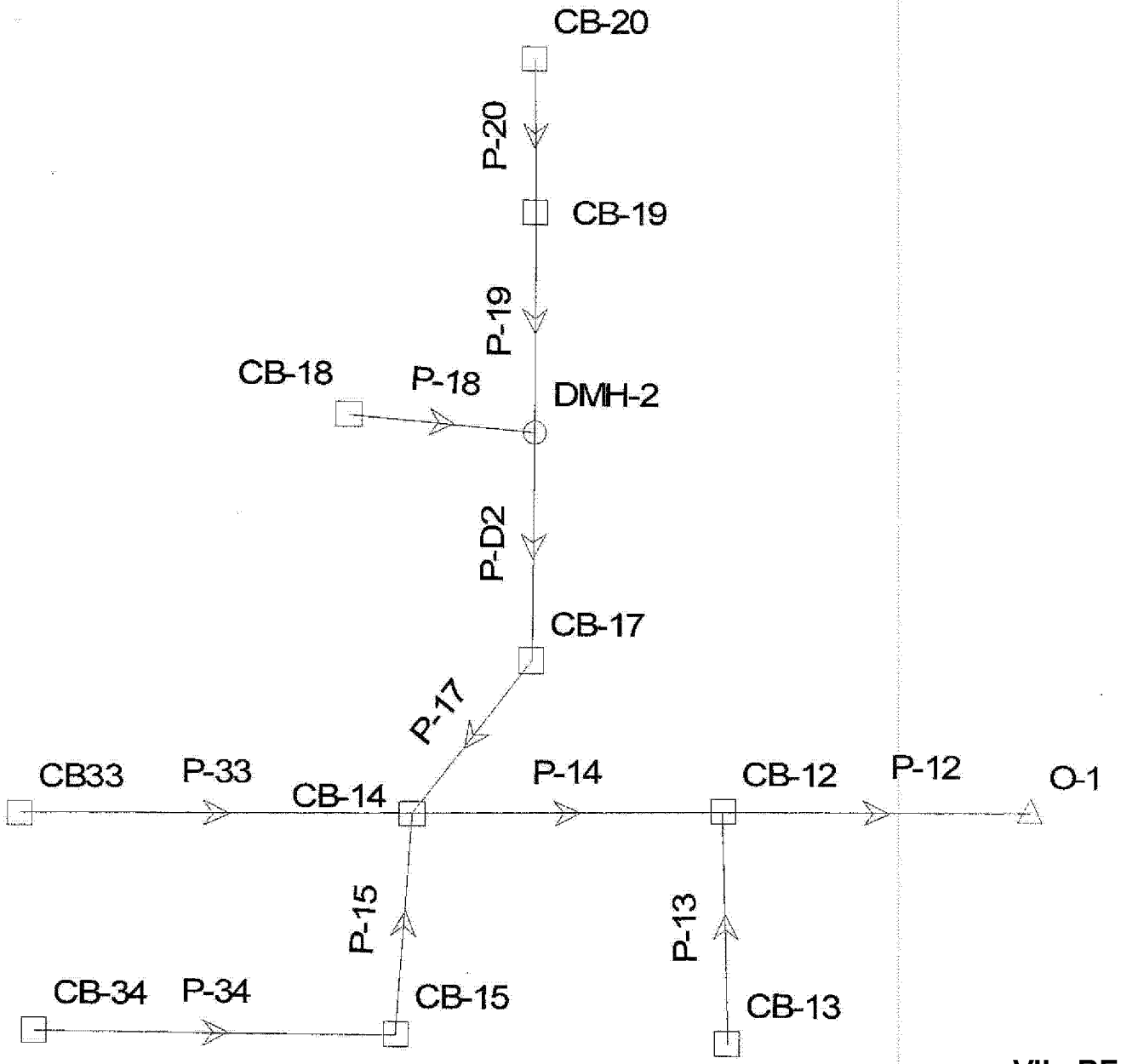


Scenario: Base

Combined Pipe\Node Report

Label	Upstream Node	Downstream Node	Length (ft)	Section Size	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	System CA (ft²)	System Intensity (in/hr)	Total System Flow (cfs)	Full Capacity (cfs)	System Additional Flow (cfs)
P-29	CB-29	CB-28	16.00	12 inch	2.58	118.90	118.82	0.005000	3,741	5.30	0.46	2.73	0.00
P-28	CB-28	DMH-1	116.00	12 inch	7.56	118.72	116.00	0.023448	24,676	5.28	3.02	5.91	0.00
P-D1	DMH-1	CB-26	134.00	12 inch	9.28	115.90	110.42	0.040896	24,676	5.24	2.99	7.80	0.00
P-26	CB-26	CB-16	160.00	18 inch	4.83	109.82	108.95	0.005437	37,406	5.20	4.50	8.39	0.00
P-16	CB-16	O-1	40.00	24 inch	6.10	108.45	108.25	0.005000	66,324	5.10	13.55	17.33	5.72
P-27	CB-27	CB-26	16.00	12 inch	2.77	110.00	109.92	0.005000	4,780	5.30	0.59	2.73	0.00
P-23	CB-23	CB-22	20.00	18 inch	5.02	110.50	110.40	0.005000	3,932	5.30	6.20	8.05	5.72
P-22	CB-22	CB-24	63.00	18 inch	5.43	110.30	109.95	0.005556	15,782	5.29	7.65	8.48	5.72
P-24	CB-24	CB-16	44.00	18 inch	9.30	109.85	108.95	0.020455	22,610	5.25	8.47	16.27	5.72
P-21	CB-21	CB-22	16.00	12 inch	3.13	113.20	113.12	0.005000	7,479	5.30	0.92	2.73	0.00

Scenario: Base



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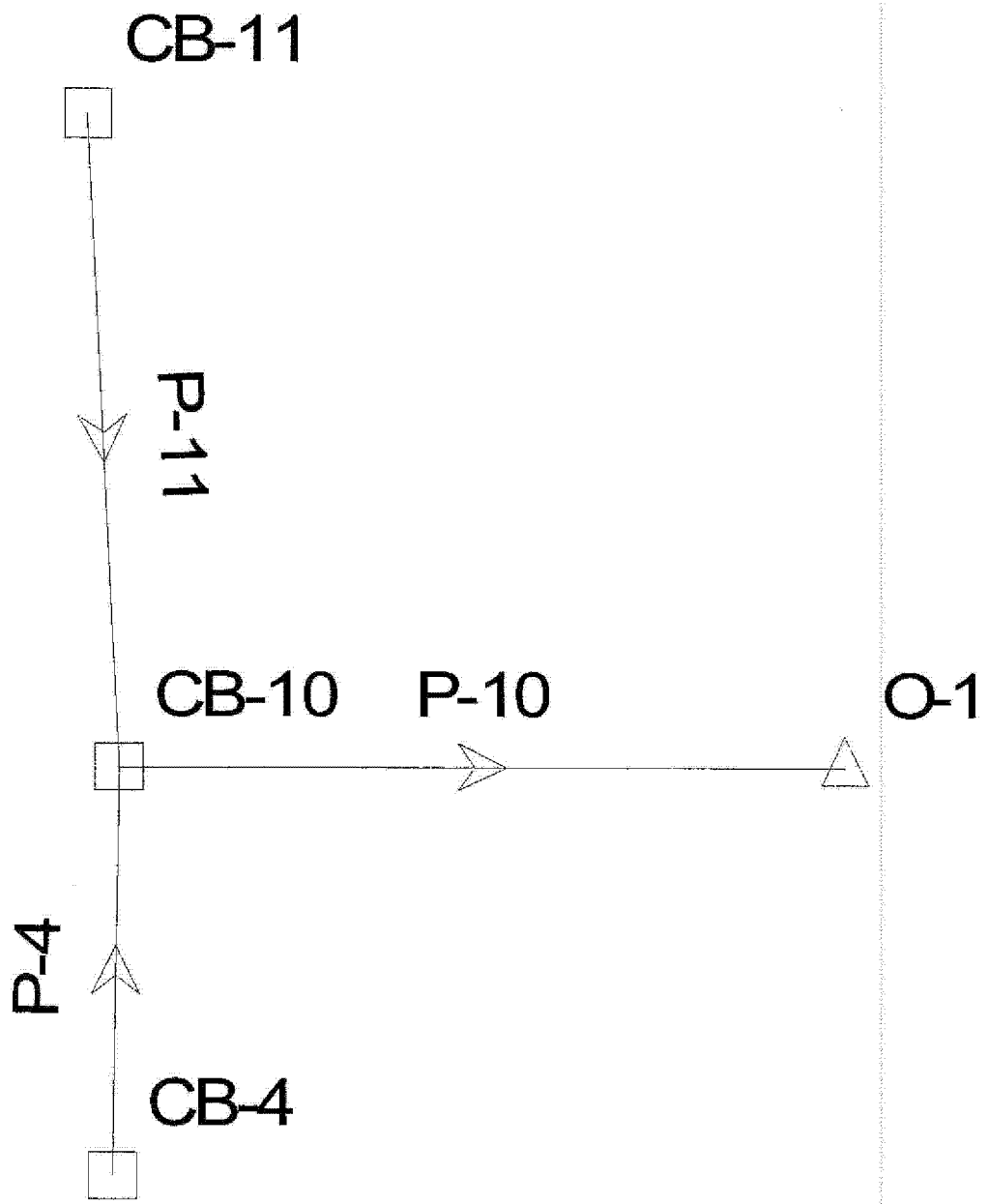
Scenario: Base

Combined Pipe\Node Report

Label	Upstream Node	Downstream Node	Length (ft)	Section Size	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	System CA (ft²)	System Intensity (in/hr)	Total System Flow (cfs)	Full Capacity (cfs)	System Additional Flow (cfs)
P-20	CB-20	CB-19	21.00	12 inch	2.41	122.80	122.69	0.005238	2,789	5.30	0.34	2.79	0.00
P-19	CB-19	DMH-2	114.00	12 inch	7.42	122.59	113.70	0.077982	4,993	5.28	0.61	10.78	0.00
P-D2	DMH-2	CB-17	130.00	12 inch	7.94	113.60	109.20	0.033846	17,935	5.23	2.17	7.10	0.00
P-17	CB-17	CB-14	23.00	18 inch	6.89	108.70	108.20	0.021739	21,639	5.19	2.60	16.78	0.00
P-14	CB-14	CB-12	32.00	18 inch	4.83	108.10	107.94	0.005000	43,170	5.18	5.17	8.05	0.00
P-18	CB-18	DMH-2	42.00	12 inch	3.61	114.70	114.49	0.005000	12,942	5.30	1.59	2.73	0.00
P-15	CB-15	CB-14	21.00	12 inch	3.86	108.70	108.59	0.005238	16,172	5.28	1.98	2.79	0.00
P-13	CB-13	CB-12	21.00	12 inch	3.35	108.80	108.69	0.005238	9,003	5.30	1.10	2.79	0.00
P-12	CB-12	O-1	55.00	18 inch	5.21	107.84	107.56	0.005091	61,845	5.16	7.38	8.12	0.00
P-33	CB33	CB-14	28.00	12 inch	3.29	108.90	108.66	0.008571	4,471	5.30	0.55	3.57	0.00
P-34	CB-34	CB-15	20.00	12 inch	3.25	108.90	108.80	0.005000	8,591	5.30	1.05	2.73	0.00

Scenario: Base

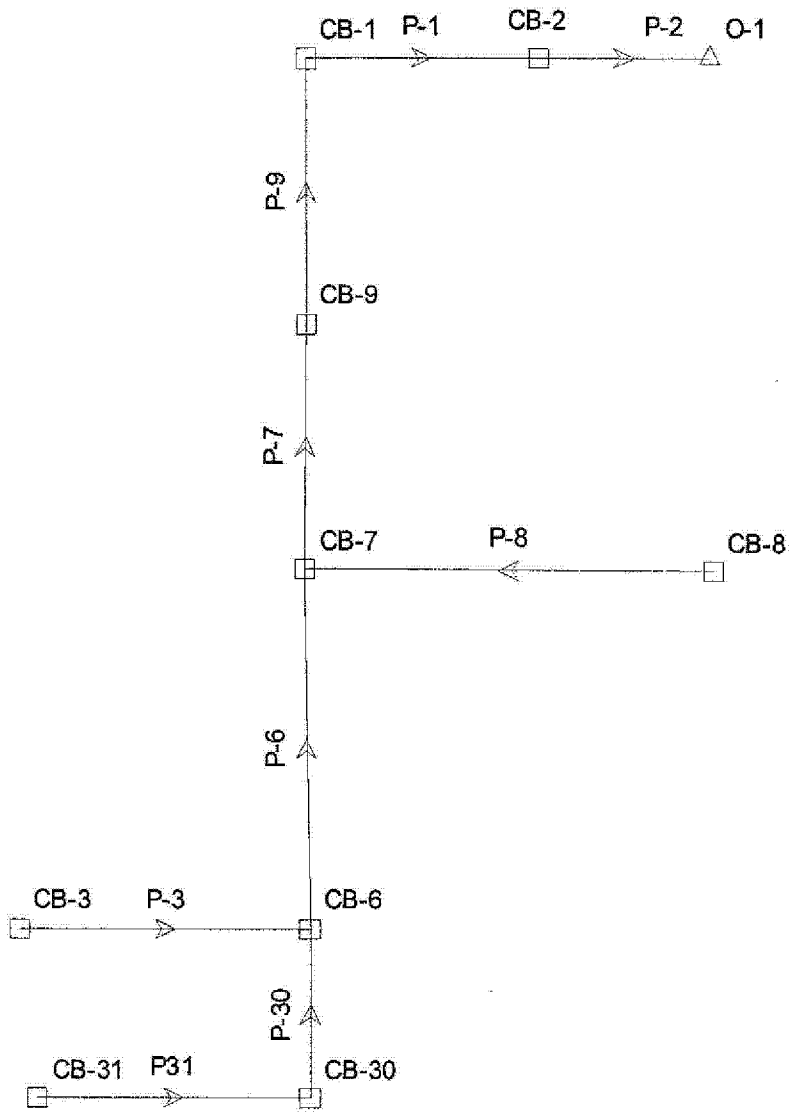


Scenario: Base

Combined Pipe\Node Report

Label	Upstream Node	Downstream Node	Length (ft)	Section Size	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	System CA (ft²)	System Intensity (in/hr)	Total System Flow (cfs)	Full Capacity (cfs)	System Additional Flow (cfs)
P-10	CB-10	O-1	73.00	18 inch	7.70	106.05	105.20	0.011644	19,019	5.20	9.67	12.28	7.38
P-11	CB-11	CB-10	116.00	12 inch	3.43	108.80	108.22	0.005000	10,597	5.30	1.30	2.73	0.00
P-4	CB-4	CB-10	71.00	12 inch	3.11	106.91	106.55	0.005070	7,185	5.30	0.88	2.75	0.00

Scenario: Base



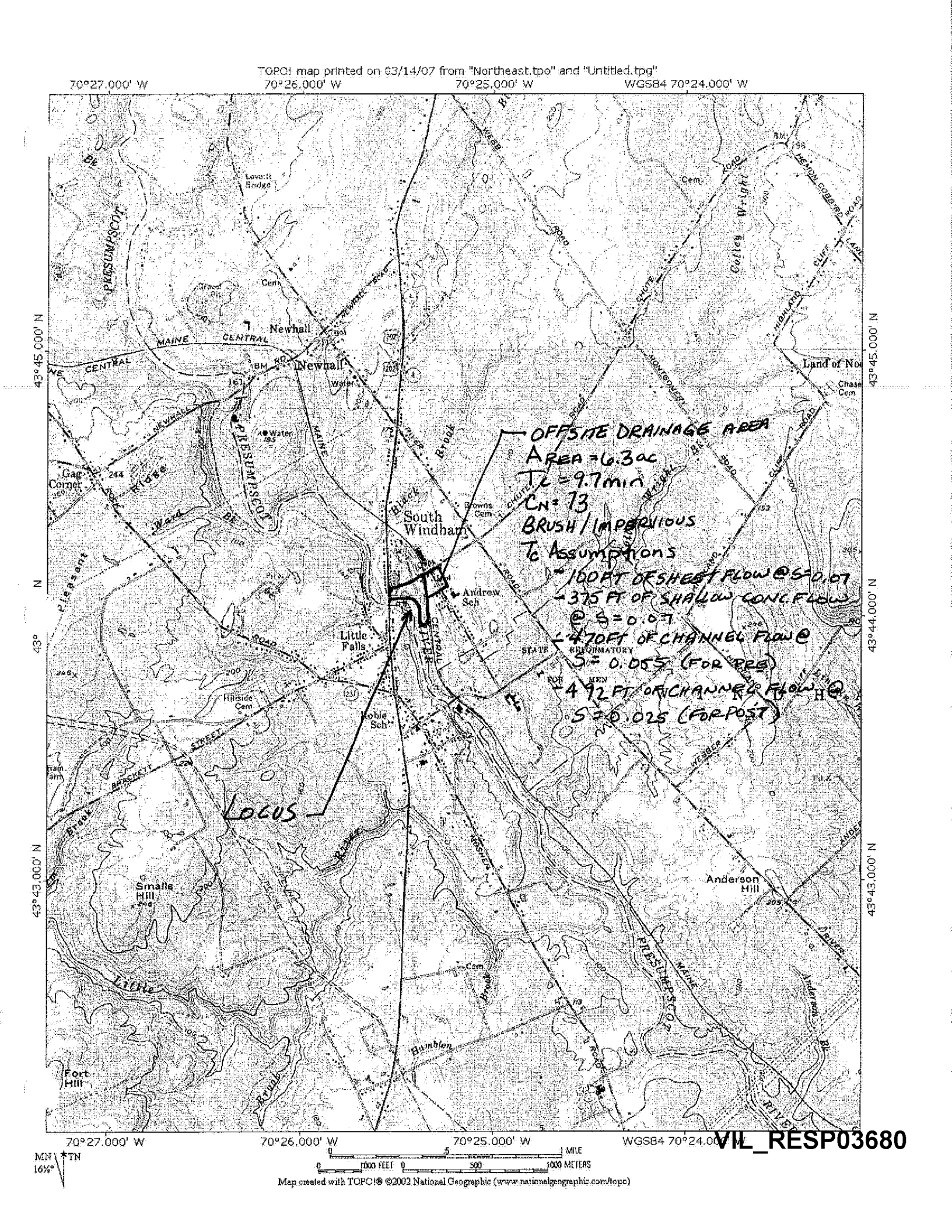
Scenario: Base

Combined Pipe\Node Report

Label	Upstream Node	Downstream Node	Length (ft)	Section Size	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	System CA (ft²)	System Intensity (in/hr)	Total System Flow (cfs)	Full Capacity (cfs)	System Additional Flow (cfs)
P-3	CB-3	CB-6	173.00	12 inch	3.98	117.70	109.10	0.049711	1,054	5.30	0.13	8.61	0.00
P-6	CB-6	CB-7	216.00	12 inch	5.74	109.00	106.00	0.013889	15,366	5.18	2.20	4.55	0.36
P-7	CB-7	CB-9	37.00	18 inch	4.74	105.40	105.20	0.005405	32,862	5.07	4.22	8.37	0.36
P-9	CB-9	CB-1	99.00	24 inch	8.47	104.70	103.60	0.011111	38,673	5.05	14.55	25.83	10.03
P-1	CB-1	CB-2	14.00	24 inch	8.19	103.50	103.36	0.010000	43,018	5.02	15.02	24.51	10.03
P-2	CB-2	O-1	63.00	30 inch	9.62	101.13	100.50	0.010000	44,171	5.01	28.70	44.43	23.58
P-30	CB-30	CB-6	48.00	12 inch	6.11	110.10	109.10	0.020833	10,020	5.27	1.58	5.57	0.36
P-8	CB-8	CB-7	19.00	12 inch	4.10	106.40	106.21	0.010000	7,958	5.30	0.98	3.86	0.00
P31	CB-31	CB-30	12.00	12 inch	1.08	109.32	109.26	0.005000	3,955	5.30	0.85	2.73	0.36

Appendix B

Offsite Drainage Area



VIL_RESP03680

NORTHEAST CIVIL SOLUTIONS, INC.
Surveying Engineering Land Planning
153 U.S. Route 1, Scarborough, Maine 04074
Tel: 207-883-1000 • Fax: 207-883-1001

PROJECT VLF
SHEET NO. 1 OF 1
CALCULATED BY DLC DATE
CHECKED BY DATE
SCALE

DISCHARGE FROM EXISTING 18" CMP CULVERT LOCATED AT EASTERN PROPERTY LINE SERVICING OFF-SITE DRAINAGE

FIND CAPACITY OF EXISTING CULVERT FLOWING FULL

$$Q = \frac{1.49}{n}(A)(r_H)^{2/3}\sqrt{S}$$

Assume Slope = 0.01 ft/ft
n for CMP = 0.024

$A = \pi r^2 = \pi(0.75)^2 = 1.77\ ft^2$ $P = \pi d = 3.14(1.5) = 4.71\ ft$

$r_H = \frac{A}{P} = \frac{1.77}{4.71} = 0.376'$

$$Q = \frac{1.49}{0.024}(1.77)(0.376)^{2/3}\sqrt{0.01}$$

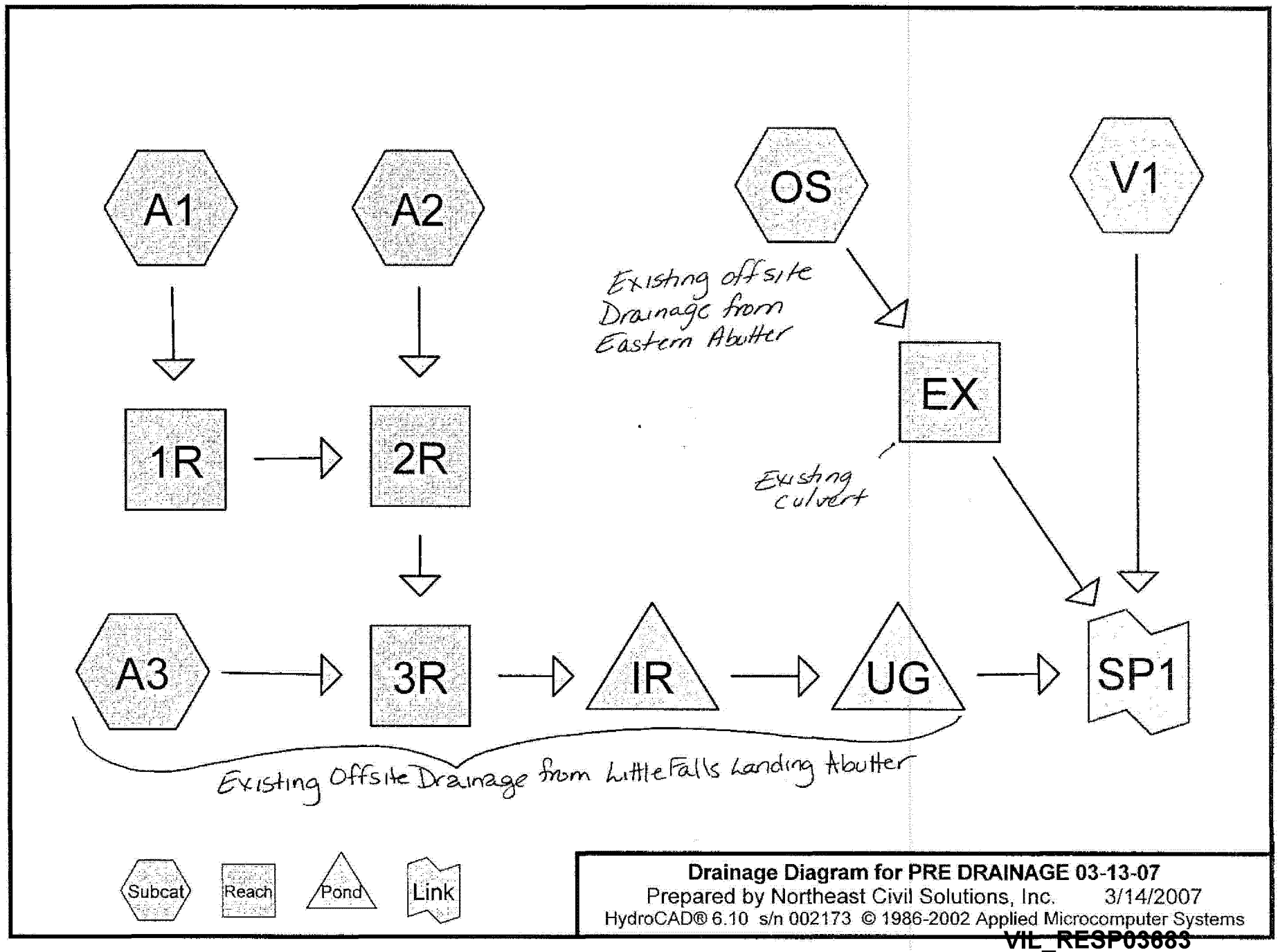
$Q = 5.72\ cfs$

The flow of 5.72 cfs will be added to CB-23.

VIL_RESP03681

Appendix C

HydroCAD Calculations



Drainage Diagram for PRE DRAINAGE 03-13-07
Prepared by Northeast Civil Solutions, Inc. 3/14/2007
HydroCAD® 6.10 s/n 002173 © 1986-2002 Applied Microcomputer Systems

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Type III 24-hr Rainfall=3.00"
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A1: AVESTA SUBCATCHMENT A1 Runoff Area=19,288 sf Runoff Depth=1.98"
Length=70' Tc=4.1 min CN=90 Runoff= 1.09 cfs 0.073 af

Subcatchment A2: AVESTA SUBCATCHMENT A2 Runoff Area=7,545 sf Runoff Depth=1.98"
Length=40' Tc=0.6 min CN=90 Runoff= 0.48 cfs 0.029 af

Subcatchment A3: AVESTA SUBCATCHMENT A3 Runoff Area=3,222 sf Runoff Depth=2.77"
Length=22' Tc=0.2 min CN=98 Runoff= 0.26 cfs 0.017 af

Subcatchment OS: Off Site Drainage Runoff Area=274,428 sf Runoff Depth=0.86"
Length=945' Tc=9.7 min CN=73 Runoff= 5.11 cfs 0.450 af

Subcatchment V1: VLF SUBCATCHMENT 1 Runoff Area=390,273 sf Runoff Depth=1.07"
Length=665' Tc=11.7 min CN=77 Runoff= 8.94 cfs 0.800 af

Reach 1R: Avesta Reach 1 Peak Depth= 0.44' Max Vel= 3.3 fps Inflow= 1.09 cfs 0.073 af
D=12.0" n=0.012 L=88.0' S=0.0050 '/' Capacity=2.73 cfs Outflow= 1.09 cfs 0.073 af

Reach 2R: Avesta Reach 2 Peak Depth= 0.42' Max Vel= 4.6 fps Inflow= 1.42 cfs 0.102 af
D=12.0" n=0.012 L=45.0' S=0.0102 '/' Capacity=3.90 cfs Outflow= 1.42 cfs 0.102 af

Reach 3R: Avesta Reach 3 Peak Depth= 0.33' Max Vel= 6.9 fps Inflow= 1.59 cfs 0.119 af
D=12.0" n=0.012 L=86.0' S=0.0294 '/' Capacity=6.62 cfs Outflow= 1.58 cfs 0.119 af

Reach EX: EXISTING CULVERT Peak Depth= 1.11' Max Vel= 3.6 fps Inflow= 5.11 cfs 0.450 af
D=18.0" n=0.024 L=45.0' S=0.0100 '/' Capacity=5.69 cfs Outflow= 5.10 cfs 0.450 af

Pond IR: Avesta Isolator Row Peak Storage= 1,053 cf @ 113.77' Inflow= 1.58 cfs 0.119 af
Primary= 1.59 cfs 0.095 af Outflow= 1.59 cfs 0.095 af

Pond UG: Avesta Underground Storage Peak Storage= 2,279 cf @ 111.27' Inflow= 1.59 cfs 0.095 af
Primary= 0.09 cfs 0.074 af Outflow= 0.09 cfs 0.074 af

Link SP1: Analysis Point 4 Inflow= 14.05 cfs 1.324 af
Primary= 14.05 cfs 1.324 af

Total Runoff Area = 15.949 ac Runoff Volume = 1.369 af Average Runoff Depth = 1.03"

Subcatchment A1: AVESTA SUBCATCHMENT A1

Runoff = 1.09 cfs @ 12.06 hrs, Volume= 0.073 af, Depth= 1.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=3.00"

Area (sf)	CN	Description
12,589	98	Paved parking & roofs
6,699	74	>75% Grass cover, Good, HSG C
19,288	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0300	0.1		**Sheet Flow, A TO B** Grass: Dense n= 0.240 P2= 3.00"
0.6	50	0.0050	1.4		**Shallow Concentrated Flow, B TO C** Paved Kv= 20.3 fps
4.1	70	Total			

Subcatchment A2: AVESTA SUBCATCHMENT A2

Runoff = 0.48 cfs @ 12.01 hrs, Volume= 0.029 af, Depth= 1.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=3.00"

Area (sf)	CN	Description
2,637	74	>75% Grass cover, Good, HSG C
4,908	98	Paved parking & roofs
7,545	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	40	0.0175	1.1		**Sheet Flow, A TO B** Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment A3: AVESTA SUBCATCHMENT A3

Runoff = 0.26 cfs @ 12.00 hrs, Volume= 0.017 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=3.00"

Area (sf)	CN	Description
3,222	98	Paved parking & roofs

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	22	0.0830	1.7		**Sheet Flow, A TO B** Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment OS: Off Site Drainage

Runoff = 5.11 cfs @ 12.15 hrs, Volume= 0.450 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=3.00"

Area (sf)	CN	Description
205,821	65	Brush, Good, HSG C
68,607	98	Paved parking & roofs
274,428	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.0700	0.3		**Sheet Flow, Sheet** Range n= 0.130 P2= 3.00"
3.4	375	0.0700	1.9		**Shallow Concentrated Flow, Shallow Concentrated** Short Grass Pasture Kv= 7.0 fps
0.8	470	0.0550	9.3	9.31	**Channel Flow, Channel** Area= 1.0 sf Perim= 3.0' r= 0.33' n= 0.018
9.7	945	Total			

Subcatchment V1: VLF SUBCATCHMENT 1

Runoff = 8.94 cfs @ 12.17 hrs, Volume= 0.800 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=3.00"

Area (sf)	CN	Description
71,592	98	Paved parking & roofs
154,962	79	50-75% Grass cover, Fair, HSG C
26,880	84	50-75% Grass cover, Fair, HSG D
26,800	69	50-75% Grass cover, Fair, HSG B
59,158	56	Brush, Fair, HSG B
50,881	70	Brush, Fair, HSG C
390,273	77	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	100	0.0200	0.2		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.00"
0.8	145	0.0440	3.1		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
0.8	420	0.0550	9.3	9.31	**Channel Flow, B-C** Area= 1.0 sf Perim= 3.0' r= 0.33' n= 0.018
11.7	665	Total			

Reach 1R: Avesta Reach 1

Inflow Area = 0.443 ac, Inflow Depth = 1.98"
Inflow = 1.09 cfs @ 12.06 hrs, Volume= 0.073 af
Outflow = 1.09 cfs @ 12.07 hrs, Volume= 0.073 af, Atten= 1%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.3 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.1 fps, Avg. Travel Time= 1.3 min

Peak Depth= 0.44'
Capacity at bank full= 2.73 cfs
Inlet Invert= 117.80', Outlet Invert= 117.36'
12.0" Diameter Pipe n= 0.012 Length= 88.0' Slope= 0.0050 '/'

Reach 2R: Avesta Reach 2

Inflow Area = 0.616 ac, Inflow Depth = 1.98"
Inflow = 1.42 cfs @ 12.06 hrs, Volume= 0.102 af
Outflow = 1.42 cfs @ 12.07 hrs, Volume= 0.102 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.6 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.6 fps, Avg. Travel Time= 0.5 min

Peak Depth= 0.42'
Capacity at bank full= 3.90 cfs
Inlet Invert= 117.10', Outlet Invert= 116.64'
12.0" Diameter Pipe n= 0.012 Length= 45.0' Slope= 0.0102 '/'

Reach 3R: Avesta Reach 3

Inflow Area = 0.690 ac, Inflow Depth = 2.07"
Inflow = 1.59 cfs @ 12.06 hrs, Volume= 0.119 af
Outflow = 1.58 cfs @ 12.06 hrs, Volume= 0.119 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.9 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.1 fps, Avg. Travel Time= 0.7 min

Peak Depth= 0.33'
Capacity at bank full= 6.62 cfs
Inlet Invert= 116.20', Outlet Invert= 113.67'
12.0" Diameter Pipe n= 0.012 Length= 86.0' Slope= 0.0294 '/'

Reach EX: EXISTING CULVERT

Inflow Area = 6.300 ac, Inflow Depth = 0.86"
Inflow = 5.11 cfs @ 12.15 hrs, Volume= 0.450 af
Outflow = 5.10 cfs @ 12.15 hrs, Volume= 0.450 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.6 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.6 fps, Avg. Travel Time= 0.5 min

Peak Depth= 1.11'
Capacity at bank full= 5.69 cfs
18.0" Diameter Pipe n= 0.024 Length= 45.0' Slope= 0.0100 '/'

Pond IR: Avesta Isolator Row

Inflow Area = 0.690 ac, Inflow Depth = 2.07"
Inflow = 1.58 cfs @ 12.06 hrs, Volume= 0.119 af
Outflow = 1.59 cfs @ 12.07 hrs, Volume= 0.095 af, Atten= 0%, Lag= 0.1 min
Primary = 1.59 cfs @ 12.07 hrs, Volume= 0.095 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 113.77' Storage= 1,053 cf
Plug-Flow detention time= 120.3 min calculated for 0.095 af (80% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	350	350
112.00	350	700
113.00	300	1,000
113.50	50	1,050
114.00	6	1,056
115.00	6	1,062
116.00	6	1,068
118.00	6	1,074

Primary OutFlow Max=1.58 cfs @ 12.07 hrs HW=113.77' (Free Discharge)
↑—1=Broad-Crested Rectangular Weir (Controls 1.58 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	113.50'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Pond UG: Avesta Underground Storage

Inflow Area = 0.690 ac, Inflow Depth = 1.65"
Inflow = 1.59 cfs @ 12.07 hrs, Volume= 0.095 af
Outflow = 0.09 cfs @ 14.32 hrs, Volume= 0.074 af, Atten= 95%, Lag= 135.1 min
Primary = 0.09 cfs @ 14.32 hrs, Volume= 0.074 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 111.27' Storage= 2,279 cf
Plug-Flow detention time= 344.3 min calculated for 0.074 af (78% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	1,798	1,798
112.00	1,798	3,596
113.00	1,698	5,294
113.50	100	5,394

Primary OutFlow Max=0.09 cfs @ 14.32 hrs HW=111.27' (Free Discharge)
└**1=Orifice/Grate** (Controls 0.09 cfs)
└**2=Orifice/Grate** (Controls 0.00 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	110.50'	**2.0" Vert. Orifice/Grate** C= 0.600
2	Primary	112.00'	**4.0" Vert. Orifice/Grate** C= 0.600

Link SP1: Analysis Point 4

Inflow Area = 15.949 ac, Inflow Depth = 1.00"
Inflow = 14.05 cfs @ 12.16 hrs, Volume= 1.324 af
Primary = 14.05 cfs @ 12.16 hrs, Volume= 1.324 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Type III 24-hr Rainfall=4.70"
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A1: AVESTA SUBCATCHMENT A1 Runoff Area=19,288 sf Runoff Depth=3.59"
Length=70' Tc=4.1 min CN=90 Runoff= 1.93 cfs 0.132 af

Subcatchment A2: AVESTA SUBCATCHMENT A2 Runoff Area=7,545 sf Runoff Depth=3.59"
Length=40' Tc=0.6 min CN=90 Runoff= 0.85 cfs 0.052 af

Subcatchment A3: AVESTA SUBCATCHMENT A3 Runoff Area=3,222 sf Runoff Depth=4.46"
Length=22' Tc=0.2 min CN=98 Runoff= 0.41 cfs 0.028 af

Subcatchment OS: Off Site Drainage Runoff Area=274,428 sf Runoff Depth=2.05"
Length=945' Tc=9.7 min CN=73 Runoff= 13.16 cfs 1.075 af

Subcatchment V1: VLF SUBCATCHMENT 1 Runoff Area=390,273 sf Runoff Depth=2.37"
Length=665' Tc=11.7 min CN=77 Runoff= 20.62 cfs 1.773 af

Reach 1R: Avesta Reach 1 Peak Depth= 0.62' Max Vel= 3.8 fps Inflow= 1.93 cfs 0.132 af
D=12.0" n=0.012 L=88.0' S=0.0050 '/' Capacity=2.73 cfs Outflow= 1.92 cfs 0.132 af

Reach 2R: Avesta Reach 2 Peak Depth= 0.58' Max Vel= 5.3 fps Inflow= 2.51 cfs 0.184 af
D=12.0" n=0.012 L=45.0' S=0.0102 '/' Capacity=3.90 cfs Outflow= 2.51 cfs 0.184 af

Reach 3R: Avesta Reach 3 Peak Depth= 0.45' Max Vel= 8.1 fps Inflow= 2.78 cfs 0.212 af
D=12.0" n=0.012 L=86.0' S=0.0294 '/' Capacity=6.62 cfs Outflow= 2.78 cfs 0.212 af

Reach EX: EXISTING CULVERT Peak Depth= 1.50' Max Vel= 3.7 fps Inflow= 13.16 cfs 1.075 af
D=18.0" n=0.024 L=45.0' S=0.0100 '/' Capacity=5.69 cfs Outflow= 5.98 cfs 1.075 af

Pond IR: Avesta Isolator Row Peak Storage= 1,055 cf @ 113.88' Inflow= 2.78 cfs 0.212 af
Primary= 2.78 cfs 0.188 af Outflow= 2.78 cfs 0.188 af

Pond UG: Avesta Underground Storage Peak Storage= 4,338 cf @ 112.44' Inflow= 2.78 cfs 0.188 af
Primary= 0.36 cfs 0.167 af Outflow= 0.36 cfs 0.167 af

Link SP1: Analysis Point 4 Inflow= 26.43 cfs 3.014 af
Primary= 26.43 cfs 3.014 af

Total Runoff Area = 15.949 ac Runoff Volume = 3.059 af Average Runoff Depth = 2.30"

Subcatchment A1: AVESTA SUBCATCHMENT A1

Runoff = 1.93 cfs @ 12.06 hrs, Volume= 0.132 af, Depth= 3.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
12,589	98	Paved parking & roofs
6,699	74	>75% Grass cover, Good, HSG C
19,288	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0300	0.1		**Sheet Flow, A TO B** Grass: Dense n= 0.240 P2= 3.00"
0.6	50	0.0050	1.4		**Shallow Concentrated Flow, B TO C** Paved Kv= 20.3 fps
4.1	70	Total			

Subcatchment A2: AVESTA SUBCATCHMENT A2

Runoff = 0.85 cfs @ 12.01 hrs, Volume= 0.052 af, Depth= 3.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
2,637	74	>75% Grass cover, Good, HSG C
4,908	98	Paved parking & roofs
7,545	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	40	0.0175	1.1		**Sheet Flow, A TO B** Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment A3: AVESTA SUBCATCHMENT A3

Runoff = 0.41 cfs @ 12.00 hrs, Volume= 0.028 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
3,222	98	Paved parking & roofs

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	22	0.0830	1.7		**Sheet Flow, A TO B** Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment OS: Off Site Drainage

Runoff = 13.16 cfs @ 12.14 hrs, Volume= 1.075 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
205,821	65	Brush, Good, HSG C
68,607	98	Paved parking & roofs
274,428	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.0700	0.3		**Sheet Flow, Sheet** Range n= 0.130 P2= 3.00"
3.4	375	0.0700	1.9		**Shallow Concentrated Flow, Shallow Concentrated** Short Grass Pasture Kv= 7.0 fps
0.8	470	0.0550	9.3	9.31	**Channel Flow, Channel** Area= 1.0 sf Perim= 3.0' r= 0.33' n= 0.018
9.7	945	Total			

Subcatchment V1: VLF SUBCATCHMENT 1

Runoff = 20.62 cfs @ 12.16 hrs, Volume= 1.773 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
71,592	98	Paved parking & roofs
154,962	79	50-75% Grass cover, Fair, HSG C
26,880	84	50-75% Grass cover, Fair, HSG D
26,800	69	50-75% Grass cover, Fair, HSG B
59,158	56	Brush, Fair, HSG B
50,881	70	Brush, Fair, HSG C
390,273	77	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	100	0.0200	0.2		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.00"
0.8	145	0.0440	3.1		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
0.8	420	0.0550	9.3	9.31	**Channel Flow, B-C** Area= 1.0 sf Perim= 3.0' r= 0.33' n= 0.018
11.7	665	Total			

Reach 1R: Avesta Reach 1

Inflow Area = 0.443 ac, Inflow Depth = 3.59"
Inflow = 1.93 cfs @ 12.06 hrs, Volume= 0.132 af
Outflow = 1.92 cfs @ 12.07 hrs, Volume= 0.132 af, Atten= 1%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.8 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.3 fps, Avg. Travel Time= 1.2 min

Peak Depth= 0.62'
Capacity at bank full= 2.73 cfs
Inlet Invert= 117.80', Outlet Invert= 117.36'
12.0" Diameter Pipe n= 0.012 Length= 88.0' Slope= 0.0050 '/'

Reach 2R: Avesta Reach 2

Inflow Area = 0.616 ac, Inflow Depth = 3.59"
Inflow = 2.51 cfs @ 12.06 hrs, Volume= 0.184 af
Outflow = 2.51 cfs @ 12.06 hrs, Volume= 0.184 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.3 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.8 fps, Avg. Travel Time= 0.4 min

Peak Depth= 0.58'
Capacity at bank full= 3.90 cfs
Inlet Invert= 117.10', Outlet Invert= 116.64'
12.0" Diameter Pipe n= 0.012 Length= 45.0' Slope= 0.0102 '/'

Reach 3R: Avesta Reach 3

Inflow Area = 0.690 ac, Inflow Depth = 3.68"
Inflow = 2.78 cfs @ 12.06 hrs, Volume= 0.212 af
Outflow = 2.78 cfs @ 12.06 hrs, Volume= 0.212 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.1 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.5 fps, Avg. Travel Time= 0.6 min

Peak Depth= 0.45'
Capacity at bank full= 6.62 cfs
Inlet Invert= 116.20', Outlet Invert= 113.67'
12.0" Diameter Pipe n= 0.012 Length= 86.0' Slope= 0.0294 '/'

Reach EX: EXISTING CULVERT

Inflow Area = 6.300 ac, Inflow Depth = 2.05"
Inflow = 13.16 cfs @ 12.14 hrs, Volume= 1.075 af
Outflow = 5.98 cfs @ 12.01 hrs, Volume= 1.075 af, Atten= 55%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.7 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.9 fps, Avg. Travel Time= 0.4 min

Peak Depth= 1.50'
Capacity at bank full= 5.69 cfs
18.0" Diameter Pipe n= 0.024 Length= 45.0' Slope= 0.0100 '/'

Pond IR: Avesta Isolator Row

Inflow Area = 0.690 ac, Inflow Depth = 3.68"
Inflow = 2.78 cfs @ 12.06 hrs, Volume= 0.212 af
Outflow = 2.78 cfs @ 12.06 hrs, Volume= 0.188 af, Atten= 0%, Lag= 0.0 min
Primary = 2.78 cfs @ 12.06 hrs, Volume= 0.188 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 113.88' Storage= 1,055 cf
Plug-Flow detention time= 85.7 min calculated for 0.188 af (89% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	350	350
112.00	350	700
113.00	300	1,000
113.50	50	1,050
114.00	6	1,056
115.00	6	1,062
116.00	6	1,068
118.00	6	1,074

Primary OutFlow Max=2.76 cfs @ 12.06 hrs HW=113.88' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 2.76 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	113.50'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Pond UG: Avesta Underground Storage

Inflow Area = 0.690 ac, Inflow Depth = 3.26"
Inflow = 2.78 cfs @ 12.06 hrs, Volume= 0.188 af
Outflow = 0.36 cfs @ 12.61 hrs, Volume= 0.167 af, Atten= 87%, Lag= 33.0 min
Primary = 0.36 cfs @ 12.61 hrs, Volume= 0.167 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 112.44' Storage= 4,338 cf
Plug-Flow detention time= 323.1 min calculated for 0.167 af (89% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	1,798	1,798
112.00	1,798	3,596
113.00	1,698	5,294
113.50	100	5,394

Primary OutFlow Max=0.36 cfs @ 12.61 hrs HW=112.44' (Free Discharge)
↑—**1=Orifice/Grate** (Controls 0.14 cfs)
└—**2=Orifice/Grate** (Controls 0.22 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	110.50'	**2.0" Vert. Orifice/Grate** C= 0.600
2	Primary	112.00'	**4.0" Vert. Orifice/Grate** C= 0.600

Link SP1: Analysis Point 4

Inflow Area = 15.949 ac, Inflow Depth = 2.27"
Inflow = 26.43 cfs @ 12.16 hrs, Volume= 3.014 af
Primary = 26.43 cfs @ 12.16 hrs, Volume= 3.014 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Type III 24-hr Rainfall=5.50"
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A1: AVESTA SUBCATCHMENT A1 Runoff Area=19,288 sf Runoff Depth=4.36"
Length=70' Tc=4.1 min CN=90 Runoff= 2.32 cfs 0.161 af

Subcatchment A2: AVESTA SUBCATCHMENT A2 Runoff Area=7,545 sf Runoff Depth=4.36"
Length=40' Tc=0.6 min CN=90 Runoff= 1.03 cfs 0.063 af

Subcatchment A3: AVESTA SUBCATCHMENT A3 Runoff Area=3,222 sf Runoff Depth=5.26"
Length=22' Tc=0.2 min CN=98 Runoff= 0.48 cfs 0.032 af

Subcatchment OS: Off Site Drainage Runoff Area=274,428 sf Runoff Depth=2.68"
Length=945' Tc=9.7 min CN=73 Runoff= 17.37 cfs 1.406 af

Subcatchment V1: VLF SUBCATCHMENT 1 Runoff Area=390,273 sf Runoff Depth=3.05"
Length=665' Tc=11.7 min CN=77 Runoff= 26.54 cfs 2.275 af

Reach 1R: Avesta Reach 1 Peak Depth= 0.71' Max Vel= 3.9 fps Inflow= 2.32 cfs 0.161 af
D=12.0" n=0.012 L=88.0' S=0.0050 '/' Capacity=2.73 cfs Outflow= 2.31 cfs 0.161 af

Reach 2R: Avesta Reach 2 Peak Depth= 0.66' Max Vel= 5.5 fps Inflow= 3.02 cfs 0.224 af
D=12.0" n=0.012 L=45.0' S=0.0102 '/' Capacity=3.90 cfs Outflow= 3.02 cfs 0.224 af

Reach 3R: Avesta Reach 3 Peak Depth= 0.50' Max Vel= 8.4 fps Inflow= 3.34 cfs 0.256 af
D=12.0" n=0.012 L=86.0' S=0.0294 '/' Capacity=6.62 cfs Outflow= 3.34 cfs 0.256 af

Reach EX: EXISTING CULVERT Peak Depth= 1.50' Max Vel= 3.7 fps Inflow= 17.37 cfs 1.406 af
D=18.0" n=0.024 L=45.0' S=0.0100 '/' Capacity=5.69 cfs Outflow= 6.04 cfs 1.406 af

Pond IR: Avesta Isolator Row Peak Storage= 1,055 cf @ 113.93' Inflow= 3.34 cfs 0.256 af
Primary= 3.34 cfs 0.232 af Outflow= 3.34 cfs 0.232 af

Pond UG: Avesta Underground Storage Peak Storage= 5,227 cf @ 112.96' Inflow= 3.34 cfs 0.232 af
Primary= 0.54 cfs 0.211 af Outflow= 0.54 cfs 0.211 af

Link SP1: Analysis Point 4 Inflow= 32.60 cfs 3.892 af
Primary= 32.60 cfs 3.892 af

Total Runoff Area = 15.949 ac Runoff Volume = 3.937 af Average Runoff Depth = 2.96"

Subcatchment A1: AVESTA SUBCATCHMENT A1

Runoff = 2.32 cfs @ 12.06 hrs, Volume= 0.161 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
12,589	98	Paved parking & roofs
6,699	74	>75% Grass cover, Good, HSG C
19,288	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0300	0.1		**Sheet Flow, A TO B** Grass: Dense n= 0.240 P2= 3.00"
0.6	50	0.0050	1.4		**Shallow Concentrated Flow, B TO C** Paved Kv= 20.3 fps
4.1	70	Total			

Subcatchment A2: AVESTA SUBCATCHMENT A2

Runoff = 1.03 cfs @ 12.01 hrs, Volume= 0.063 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
2,637	74	>75% Grass cover, Good, HSG C
4,908	98	Paved parking & roofs
7,545	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	40	0.0175	1.1		**Sheet Flow, A TO B** Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment A3: AVESTA SUBCATCHMENT A3

Runoff = 0.48 cfs @ 12.00 hrs, Volume= 0.032 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
3,222	98	Paved parking & roofs

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	22	0.0830	1.7		**Sheet Flow, A TO B** Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment OS: Off Site Drainage

Runoff = 17.37 cfs @ 12.14 hrs, Volume= 1.406 af, Depth= 2.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
205,821	65	Brush, Good, HSG C
68,607	98	Paved parking & roofs
274,428	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.0700	0.3		**Sheet Flow, Sheet** Range n= 0.130 P2= 3.00"
3.4	375	0.0700	1.9		**Shallow Concentrated Flow, Shallow Concentrated** Short Grass Pasture Kv= 7.0 fps
0.8	470	0.0550	9.3	9.31	**Channel Flow, Channel** Area= 1.0 sf Perim= 3.0' r= 0.33' n= 0.018
9.7	945	Total			

Subcatchment V1: VLF SUBCATCHMENT 1

Runoff = 26.54 cfs @ 12.16 hrs, Volume= 2.275 af, Depth= 3.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
71,592	98	Paved parking & roofs
154,962	79	50-75% Grass cover, Fair, HSG C
26,880	84	50-75% Grass cover, Fair, HSG D
26,800	69	50-75% Grass cover, Fair, HSG B
59,158	56	Brush, Fair, HSG B
50,881	70	Brush, Fair, HSG C
390,273	77	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	100	0.0200	0.2		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.00"
0.8	145	0.0440	3.1		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
0.8	420	0.0550	9.3	9.31	**Channel Flow, B-C** Area= 1.0 sf Perim= 3.0' r= 0.33' n= 0.018
11.7	665	Total			

Reach 1R: Avesta Reach 1

Inflow Area = 0.443 ac, Inflow Depth = 4.36"
Inflow = 2.32 cfs @ 12.06 hrs, Volume= 0.161 af
Outflow = 2.31 cfs @ 12.07 hrs, Volume= 0.161 af, Atten= 1%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.9 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.3 fps, Avg. Travel Time= 1.1 min

Peak Depth= 0.71'
Capacity at bank full= 2.73 cfs
Inlet Invert= 117.80', Outlet Invert= 117.36'
12.0" Diameter Pipe n= 0.012 Length= 88.0' Slope= 0.0050 '/'

Reach 2R: Avesta Reach 2

Inflow Area = 0.616 ac, Inflow Depth = 4.36"
Inflow = 3.02 cfs @ 12.06 hrs, Volume= 0.224 af
Outflow = 3.02 cfs @ 12.06 hrs, Volume= 0.224 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.5 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.9 fps, Avg. Travel Time= 0.4 min

Peak Depth= 0.66'
Capacity at bank full= 3.90 cfs
Inlet Invert= 117.10', Outlet Invert= 116.64'
12.0" Diameter Pipe n= 0.012 Length= 45.0' Slope= 0.0102 '/'

Reach 3R: Avesta Reach 3

Inflow Area = 0.690 ac, Inflow Depth = 4.46"
Inflow = 3.34 cfs @ 12.06 hrs, Volume= 0.256 af
Outflow = 3.34 cfs @ 12.06 hrs, Volume= 0.256 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.4 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.6 fps, Avg. Travel Time= 0.5 min

Peak Depth= 0.50'
Capacity at bank full= 6.62 cfs
Inlet Invert= 116.20', Outlet Invert= 113.67'
12.0" Diameter Pipe n= 0.012 Length= 86.0' Slope= 0.0294 '/'

Reach EX: EXISTING CULVERT

Inflow Area = 6.300 ac, Inflow Depth = 2.68"
Inflow = 17.37 cfs @ 12.14 hrs, Volume= 1.406 af
Outflow = 6.04 cfs @ 11.95 hrs, Volume= 1.406 af, Atten= 65%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.7 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.0 fps, Avg. Travel Time= 0.4 min

Peak Depth= 1.50'
Capacity at bank full= 5.69 cfs
18.0" Diameter Pipe n= 0.024 Length= 45.0' Slope= 0.0100 '/'

Pond IR: Avesta Isolator Row

Inflow Area = 0.690 ac, Inflow Depth = 4.46"
Inflow = 3.34 cfs @ 12.06 hrs, Volume= 0.256 af
Outflow = 3.34 cfs @ 12.06 hrs, Volume= 0.232 af, Atten= 0%, Lag= 0.0 min
Primary = 3.34 cfs @ 12.06 hrs, Volume= 0.232 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 113.93' Storage= 1,055 cf
Plug-Flow detention time= 76.1 min calculated for 0.232 af (91% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	350	350
112.00	350	700
113.00	300	1,000
113.50	50	1,050
114.00	6	1,056
115.00	6	1,062
116.00	6	1,068
118.00	6	1,074

Primary OutFlow Max=3.33 cfs @ 12.06 hrs HW=113.93' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 3.33 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	113.50'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Pond UG: Avesta Underground Storage

Inflow Area = 0.690 ac, Inflow Depth = 4.04"
Inflow = 3.34 cfs @ 12.06 hrs, Volume= 0.232 af
Outflow = 0.54 cfs @ 12.54 hrs, Volume= 0.211 af, Atten= 84%, Lag= 28.6 min
Primary = 0.54 cfs @ 12.54 hrs, Volume= 0.211 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 112.96' Storage= 5,227 cf
Plug-Flow detention time= 285.4 min calculated for 0.211 af (91% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	1,798	1,798
112.00	1,798	3,596
113.00	1,698	5,294
113.50	100	5,394

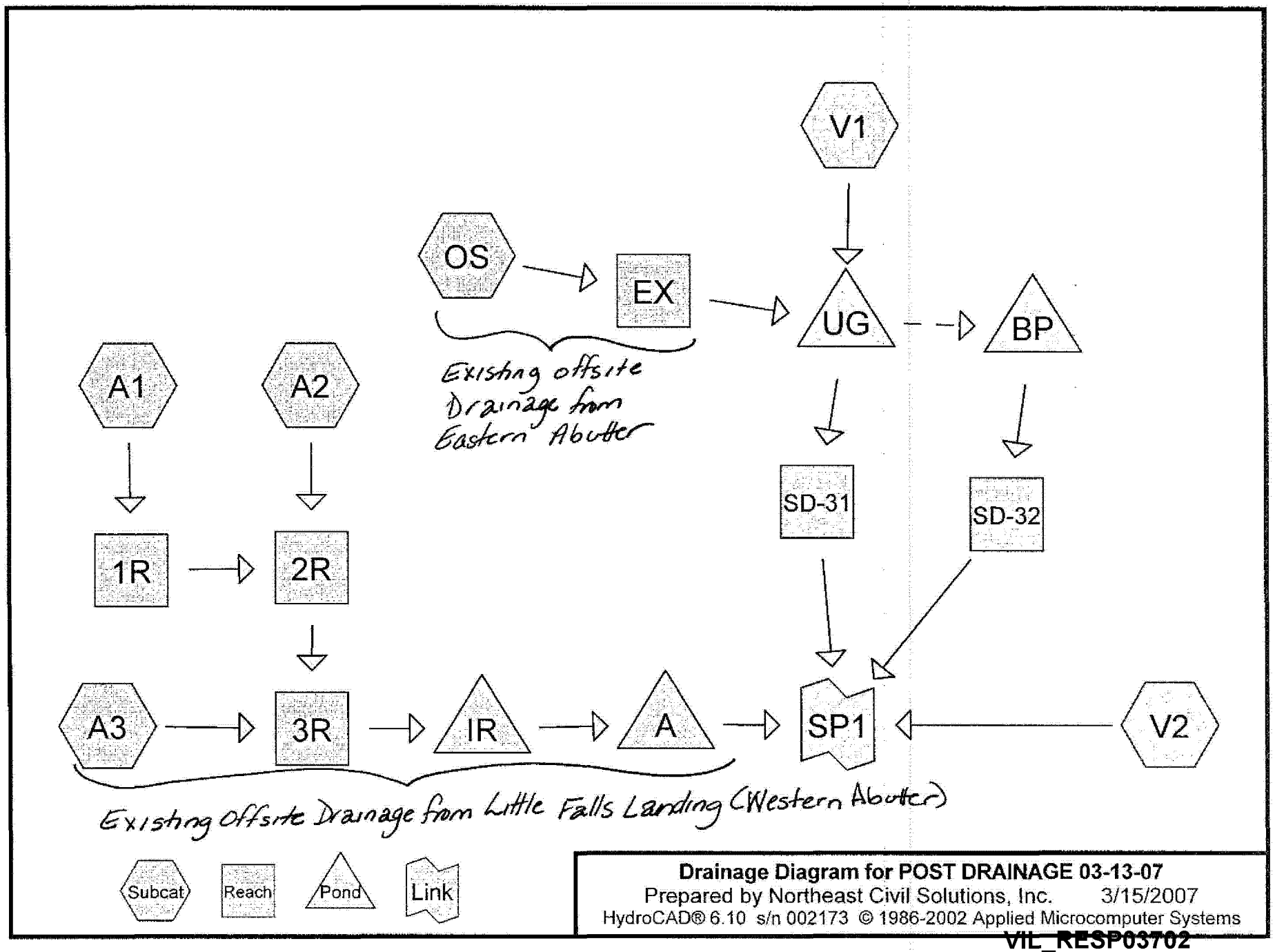
Primary OutFlow Max=0.54 cfs @ 12.54 hrs HW=112.96' (Free Discharge)
└**1=Orifice/Grate** (Controls 0.16 cfs)
└**2=Orifice/Grate** (Controls 0.37 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	110.50'	**2.0" Vert. Orifice/Grate** C= 0.600
2	Primary	112.00'	**4.0" Vert. Orifice/Grate** C= 0.600

Link SP1: Analysis Point 4

Inflow Area = 15.949 ac, Inflow Depth = 2.93"
Inflow = 32.60 cfs @ 12.16 hrs, Volume= 3.892 af
Primary = 32.60 cfs @ 12.16 hrs, Volume= 3.892 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs



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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Type III 24-hr Rainfall=3.00"
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A1: AVESTA SUBCATCHMENT A1 Runoff Area=19,288 sf Runoff Depth=1.98"
Length=70' Tc=4.1 min CN=90 Runoff= 1.09 cfs 0.073 af

Subcatchment A2: AVESTA SUBCATCHMENT A2 Runoff Area=7,545 sf Runoff Depth=1.98"
Length=40' Tc=0.6 min CN=90 Runoff= 0.48 cfs 0.029 af

Subcatchment A3: AVESTA SUBCATCHMENT A3 Runoff Area=3,222 sf Runoff Depth=2.77"
Length=22' Tc=0.2 min CN=98 Runoff= 0.26 cfs 0.017 af

Subcatchment OS: Off-site Drainage Area Runoff Area=274,428 sf Runoff Depth=0.86"
Length=967' Tc=9.7 min CN=73 Runoff= 5.11 cfs 0.450 af

Subcatchment V1: VLF SUBCATCHMENT 1 Runoff Area=281,405 sf Runoff Depth=1.82"
Length=890' Tc=7.6 min CN=88 Runoff= 13.00 cfs 0.979 af

Subcatchment V2: VLF - POST 2 Runoff Area=108,868 sf Runoff Depth=0.96"
Length=187' Tc=3.4 min CN=75 Runoff= 2.93 cfs 0.200 af

Reach 1R: Avesta Reach 1 Peak Depth= 0.44' Max Vel= 3.3 fps Inflow= 1.09 cfs 0.073 af
D=12.0" n=0.012 L=88.0' S=0.0050 '/' Capacity=2.73 cfs Outflow= 1.09 cfs 0.073 af

Reach 2R: Avesta Reach 2 Peak Depth= 0.42' Max Vel= 4.6 fps Inflow= 1.42 cfs 0.102 af
D=12.0" n=0.012 L=45.0' S=0.0102 '/' Capacity=3.90 cfs Outflow= 1.42 cfs 0.102 af

Reach 3R: Avesta Reach 3 Peak Depth= 0.33' Max Vel= 6.9 fps Inflow= 1.59 cfs 0.119 af
D=12.0" n=0.012 L=86.0' S=0.0294 '/' Capacity=6.62 cfs Outflow= 1.58 cfs 0.119 af

Reach EX: Existing Culvert Peak Depth= 1.11' Max Vel= 3.6 fps Inflow= 5.11 cfs 0.450 af
D=18.0" n=0.024 L=45.0' S=0.0100 '/' Capacity=5.69 cfs Outflow= 5.10 cfs 0.450 af

Reach SD-31: Storm Drain Peak Depth= 0.24' Max Vel= 3.9 fps Inflow= 0.36 cfs 0.483 af
D=6.0" n=0.012 L=48.0' S=0.0167 '/' Capacity=0.78 cfs Outflow= 0.36 cfs 0.483 af

Reach SD-32: Storm Drain Peak Depth= 1.16' Max Vel= 3.3 fps Inflow= 10.02 cfs 0.946 af
D=48.0" n=0.024 L=24.0' S=0.0050 '/' Capacity=55.02 cfs Outflow= 10.01 cfs 0.946 af

Pond A: Avesta Underground Storage Peak Storage= 2,279 cf @ 111.27' Inflow= 1.59 cfs 0.095 af
Primary= 0.09 cfs 0.074 af Outflow= 0.09 cfs 0.074 af

Pond BP: BYPASS Peak Storage= 10,115 cf @ 101.95' Inflow= 17.26 cfs 0.946 af
Primary= 10.02 cfs 0.946 af Outflow= 10.02 cfs 0.946 af

Pond IR: Avesta Isolator Row Peak Storage= 1,053 cf @ 113.77' Inflow= 1.58 cfs 0.119 af
Primary= 1.59 cfs 0.095 af Outflow= 1.59 cfs 0.095 af

Pond UG: UNDERGROUND DETENTION V1 Peak Storage= 6,376 cf @ 104.16' Inflow= 17.69 cfs 1.429 af
Primary= 0.36 cfs 0.483 af Secondary= 17.26 cfs 0.946 af Outflow= 17.62 cfs 1.429 af

Link SP1: Analysis Point 4 Inflow= 11.65 cfs 1.703 af
Primary= 11.65 cfs 1.703 af

Total Runoff Area = 15.949 ac Runoff Volume = 1.748 af Average Runoff Depth = 1.32"

Subcatchment A1: AVESTA SUBCATCHMENT A1

Runoff = 1.09 cfs @ 12.06 hrs, Volume= 0.073 af, Depth= 1.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=3.00"

Area (sf)	CN	Description
12,589	98	Paved parking & roofs
6,699	74	>75% Grass cover, Good, HSG C
19,288	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0300	0.1		**Sheet Flow, A TO B** Grass: Dense n= 0.240 P2= 3.00"
0.6	50	0.0050	1.4		**Shallow Concentrated Flow, B TO C** Paved Kv= 20.3 fps
4.1	70	Total			

Subcatchment A2: AVESTA SUBCATCHMENT A2

Runoff = 0.48 cfs @ 12.01 hrs, Volume= 0.029 af, Depth= 1.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=3.00"

Area (sf)	CN	Description
2,637	74	>75% Grass cover, Good, HSG C
4,908	98	Paved parking & roofs
7,545	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	40	0.0175	1.1		**Sheet Flow, A TO B** Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment A3: AVESTA SUBCATCHMENT A3

Runoff = 0.26 cfs @ 12.00 hrs, Volume= 0.017 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=3.00"

Area (sf)	CN	Description
3,222	98	Paved parking & roofs

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	22	0.0830	1.7		**Sheet Flow, A TO B** Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment OS: Off-site Drainage Area

Runoff = 5.11 cfs @ 12.15 hrs, Volume= 0.450 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=3.00"

Area (sf)	CN	Description
205,821	65	Brush, Good, HSG C
68,607	98	Paved parking & roofs
274,428	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.0700	0.3		**Sheet Flow, SHEET** Range n= 0.130 P2= 3.00"
3.4	375	0.0700	1.9		**Shallow Concentrated Flow, Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
0.8	492	0.0250	10.3	18.59	**Channel Flow, Pipe Flow** Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
9.7	967	Total			

Subcatchment V1: VLF SUBCATCHMENT 1

Runoff = 13.00 cfs @ 12.11 hrs, Volume= 0.979 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=3.00"

Area (sf)	CN	Description
183,899	98	Paved parking & roofs
58,945	74	>75% Grass cover, Good, HSG C
4,874	80	>75% Grass cover, Good, HSG D
33,687	61	>75% Grass cover, Good, HSG B
281,405	88	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	40	0.0700	0.2		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.00"
3.9	340	0.0050	1.4		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
0.8	510	0.0300	11.3	20.36	**Channel Flow, C-D** Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
7.6	890	Total			

Subcatchment V2: VLF - POST 2

Runoff = 2.93 cfs @ 12.06 hrs, Volume= 0.200 af, Depth= 0.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=3.00"

Area (sf)	CN	Description
7,927	98	Paved parking & roofs
96,092	74	>75% Grass cover, Good, HSG C
4,849	61	>75% Grass cover, Good, HSG B
108,868	75	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	30	0.0670	0.2		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.00"
1.0	157	0.1270	2.5		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
3.4	187	Total			

Reach 1R: Avesta Reach 1

Inflow Area = 0.443 ac, Inflow Depth = 1.98"
Inflow = 1.09 cfs @ 12.06 hrs, Volume= 0.073 af
Outflow = 1.09 cfs @ 12.07 hrs, Volume= 0.073 af, Atten= 1%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.3 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.1 fps, Avg. Travel Time= 1.3 min

Peak Depth= 0.44'
Capacity at bank full= 2.73 cfs
Inlet Invert= 117.80', Outlet Invert= 117.36'
12.0" Diameter Pipe n= 0.012 Length= 88.0' Slope= 0.0050 '/'

Reach 2R: Avesta Reach 2

Inflow Area = 0.616 ac, Inflow Depth = 1.98"
Inflow = 1.42 cfs @ 12.06 hrs, Volume= 0.102 af
Outflow = 1.42 cfs @ 12.07 hrs, Volume= 0.102 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.6 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.6 fps, Avg. Travel Time= 0.5 min

Peak Depth= 0.42'
Capacity at bank full= 3.90 cfs
Inlet Invert= 117.10', Outlet Invert= 116.64'
12.0" Diameter Pipe n= 0.012 Length= 45.0' Slope= 0.0102 '/'

Reach 3R: Avesta Reach 3

Inflow Area = 0.690 ac, Inflow Depth = 2.07"
Inflow = 1.59 cfs @ 12.06 hrs, Volume= 0.119 af
Outflow = 1.58 cfs @ 12.06 hrs, Volume= 0.119 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.9 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.1 fps, Avg. Travel Time= 0.7 min

Peak Depth= 0.33'
Capacity at bank full= 6.62 cfs
Inlet Invert= 116.20', Outlet Invert= 113.67'
12.0" Diameter Pipe n= 0.012 Length= 86.0' Slope= 0.0294 '/'

Reach EX: Existing Culvert

Inflow Area = 6.300 ac, Inflow Depth = 0.86"
Inflow = 5.11 cfs @ 12.15 hrs, Volume= 0.450 af
Outflow = 5.10 cfs @ 12.15 hrs, Volume= 0.450 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.6 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.6 fps, Avg. Travel Time= 0.5 min

Peak Depth= 1.11'
Capacity at bank full= 5.69 cfs
18.0" Diameter Pipe n= 0.024 Length= 45.0' Slope= 0.0100 '/'

Reach SD-31: Storm Drain

Inflow Area = 12.760 ac, Inflow Depth = 0.45"
Inflow = 0.36 cfs @ 12.13 hrs, Volume= 0.483 af
Outflow = 0.36 cfs @ 12.13 hrs, Volume= 0.483 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.9 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.4 fps, Avg. Travel Time= 0.3 min

Peak Depth= 0.24'
Capacity at bank full= 0.78 cfs
Inlet Invert= 97.80', Outlet Invert= 97.00'
6.0" Diameter Pipe n= 0.012 Length= 48.0' Slope= 0.0167 '/'

Reach SD-32: Storm Drain

Inflow = 10.02 cfs @ 12.30 hrs, Volume= 0.946 af
Outflow = 10.01 cfs @ 12.30 hrs, Volume= 0.946 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.3 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 0.9 fps, Avg. Travel Time= 0.4 min

Peak Depth= 1.16'
Capacity at bank full= 55.02 cfs
Inlet Invert= 98.12', Outlet Invert= 98.00'
48.0" Diameter Pipe n= 0.024 Length= 24.0' Slope= 0.0050 '/'

Pond A: Avesta Underground Storage

Inflow Area = 0.690 ac, Inflow Depth = 1.65"
Inflow = 1.59 cfs @ 12.07 hrs, Volume= 0.095 af
Outflow = 0.09 cfs @ 14.32 hrs, Volume= 0.074 af, Atten= 95%, Lag= 135.1 min
Primary = 0.09 cfs @ 14.32 hrs, Volume= 0.074 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 111.27' Storage= 2,279 cf
Plug-Flow detention time= 344.3 min calculated for 0.074 af (78% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	1,798	1,798
112.00	1,798	3,596
113.00	1,698	5,294
113.50	100	5,394

Primary OutFlow Max=0.09 cfs @ 14.32 hrs HW=111.27' (Free Discharge)
└─**1=Orifice/Grate** (Controls 0.09 cfs)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	110.50'	**2.0" Vert. Orifice/Grate** C= 0.600
2	Primary	112.00'	**4.0" Vert. Orifice/Grate** C= 0.600

Pond BP: BYPASS

Inflow = 17.26 cfs @ 12.13 hrs, Volume= 0.946 af
Outflow = 10.02 cfs @ 12.30 hrs, Volume= 0.946 af, Atten= 42%, Lag= 10.2 min
Primary = 10.02 cfs @ 12.30 hrs, Volume= 0.946 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 101.95' Storage= 10,115 cf
Plug-Flow detention time= 20.9 min calculated for 0.946 af (100% of inflow)

Elevation (feet)	Cum.Store (cubic-feet)
98.50	0
99.00	678
99.50	1,860
100.00	3,318
100.50	4,950
101.00	6,690
101.50	8,484
102.00	10,302
102.50	12,012
103.00	13,650
103.50	15,108
104.00	16,290
104.50	16,962

Primary OutFlow Max=10.01 cfs @ 12.30 hrs HW=101.95' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Orifice/Grate** (Controls 4.57 cfs)
- **3=Orifice/Grate** (Controls 5.44 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	104.50'	**8.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
2	Primary	98.50'	**10.0" Vert. Orifice/Grate** C= 0.600
3	Primary	100.90'	**22.0" Vert. Orifice/Grate** C= 0.600

Pond IR: Avesta Isolator Row

Inflow Area = 0.690 ac, Inflow Depth = 2.07"
Inflow = 1.58 cfs @ 12.06 hrs, Volume= 0.119 af
Outflow = 1.59 cfs @ 12.07 hrs, Volume= 0.095 af, Atten= 0%, Lag= 0.1 min
Primary = 1.59 cfs @ 12.07 hrs, Volume= 0.095 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 113.77' Storage= 1,053 cf
Plug-Flow detention time= 120.3 min calculated for 0.095 af (80% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	350	350
112.00	350	700
113.00	300	1,000
113.50	50	1,050
114.00	6	1,056
115.00	6	1,062
116.00	6	1,068
118.00	6	1,074

Primary OutFlow Max=1.58 cfs @ 12.07 hrs HW=113.77' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 1.58 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	113.50'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Pond UG: UNDERGROUND DETENTION V1

Inflow Area =	12.760 ac,	Inflow Depth =	1.34"	
Inflow =	17.69 cfs @	12.12 hrs, Volume=	1.429 af	
Outflow =	17.62 cfs @	12.13 hrs, Volume=	1.429 af,	Atten= 0%, Lag= 0.5 min
Primary =	0.36 cfs @	12.13 hrs, Volume=	0.483 af	
Secondary =	17.26 cfs @	12.13 hrs, Volume=	0.946 af	

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 104.16' Storage= 6,376 cf
Plug-Flow detention time= 79.4 min calculated for 1.429 af (100% of inflow)

Elevation (feet)	Cum.Store (cubic-feet)
100.50	0
100.75	175
101.00	482
101.25	864
101.50	1,304
101.75	1,781
102.00	2,279
102.25	2,804
102.50	3,328
102.75	3,858
103.00	4,378
103.25	4,881
103.50	5,358
103.75	5,798
104.00	6,180
104.25	6,487
104.50	6,662

Primary OutFlow Max=0.36 cfs @ 12.13 hrs HW=104.16' (Free Discharge)
└**1=Orifice/Grate** (Controls 0.36 cfs)

Secondary OutFlow Max=17.24 cfs @ 12.13 hrs HW=104.16' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 17.24 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	100.50'	**2.7" Vert. Orifice/Grate** C= 0.600
2	Secondary	103.40'	**8.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Link SP1: Analysis Point 4

Inflow Area = 15.949 ac, Inflow Depth = 1.28"
Inflow = 11.65 cfs @ 12.29 hrs, Volume= 1.703 af
Primary = 11.65 cfs @ 12.29 hrs, Volume= 1.703 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Type III 24-hr Rainfall=4.70"
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A1: AVESTA SUBCATCHMENT A1 Runoff Area=19,288 sf Runoff Depth=3.59"
Length=70' Tc=4.1 min CN=90 Runoff= 1.93 cfs 0.132 af

Subcatchment A2: AVESTA SUBCATCHMENT A2 Runoff Area=7,545 sf Runoff Depth=3.59"
Length=40' Tc=0.6 min CN=90 Runoff= 0.85 cfs 0.052 af

Subcatchment A3: AVESTA SUBCATCHMENT A3 Runoff Area=3,222 sf Runoff Depth=4.46"
Length=22' Tc=0.2 min CN=98 Runoff= 0.41 cfs 0.028 af

Subcatchment OS: Off-site Drainage Area Runoff Area=274,428 sf Runoff Depth=2.05"
Length=967' Tc=9.7 min CN=73 Runoff= 13.16 cfs 1.075 af

Subcatchment V1: VLF SUBCATCHMENT 1 Runoff Area=281,405 sf Runoff Depth=3.38"
Length=890' Tc=7.6 min CN=88 Runoff= 23.78 cfs 1.822 af

Subcatchment V2: VLF - POST 2 Runoff Area=108,868 sf Runoff Depth=2.21"
Length=187' Tc=3.4 min CN=75 Runoff= 7.08 cfs 0.460 af

Reach 1R: Avesta Reach 1 Peak Depth= 0.62' Max Vel= 3.8 fps Inflow= 1.93 cfs 0.132 af
D=12.0" n=0.012 L=88.0' S=0.0050 '/' Capacity=2.73 cfs Outflow= 1.92 cfs 0.132 af

Reach 2R: Avesta Reach 2 Peak Depth= 0.58' Max Vel= 5.3 fps Inflow= 2.51 cfs 0.184 af
D=12.0" n=0.012 L=45.0' S=0.0102 '/' Capacity=3.90 cfs Outflow= 2.51 cfs 0.184 af

Reach 3R: Avesta Reach 3 Peak Depth= 0.45' Max Vel= 8.1 fps Inflow= 2.78 cfs 0.212 af
D=12.0" n=0.012 L=86.0' S=0.0294 '/' Capacity=6.62 cfs Outflow= 2.78 cfs 0.212 af

Reach EX: Existing Culvert Peak Depth= 1.50' Max Vel= 3.7 fps Inflow= 13.16 cfs 1.075 af
D=18.0" n=0.024 L=45.0' S=0.0100 '/' Capacity=5.69 cfs Outflow= 5.98 cfs 1.075 af

Reach SD-31: Storm Drain Peak Depth= 0.24' Max Vel= 4.0 fps Inflow= 0.38 cfs 0.539 af
D=6.0" n=0.012 L=48.0' S=0.0167 '/' Capacity=0.78 cfs Outflow= 0.38 cfs 0.539 af

Reach SD-32: Storm Drain Peak Depth= 1.77' Max Vel= 4.1 fps Inflow= 22.29 cfs 2.358 af
D=48.0" n=0.024 L=24.0' S=0.0050 '/' Capacity=55.02 cfs Outflow= 22.28 cfs 2.358 af

Pond A: Avesta Underground Storage Peak Storage= 4,338 cf @ 112.44' Inflow= 2.78 cfs 0.188 af
Primary= 0.36 cfs 0.167 af Outflow= 0.36 cfs 0.167 af

Pond BP: BYPASS Peak Storage= 15,182 cf @ 103.53' Inflow= 29.07 cfs 2.358 af
Primary= 22.29 cfs 2.358 af Outflow= 22.29 cfs 2.358 af

Pond IR: Avesta Isolator Row Peak Storage= 1,055 cf @ 113.88' Inflow= 2.78 cfs 0.212 af
Primary= 2.78 cfs 0.188 af Outflow= 2.78 cfs 0.188 af

Pond UG: UNDERGROUND DETENTION V1 Peak Storage= 6,635 cf @ 104.46' Inflow= 29.47 cfs 2.897 af
Primary= 0.38 cfs 0.539 af Secondary= 29.07 cfs 2.358 af Outflow= 29.45 cfs 2.897 af

Link SP1: Analysis Point 4 Inflow= 26.07 cfs 3.524 af
Primary= 26.07 cfs 3.524 af

Total Runoff Area = 15.949 ac Runoff Volume = 3.569 af Average Runoff Depth = 2.69"

Subcatchment A1: AVESTA SUBCATCHMENT A1

Runoff = 1.93 cfs @ 12.06 hrs, Volume= 0.132 af, Depth= 3.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
12,589	98	Paved parking & roofs
6,699	74	>75% Grass cover, Good, HSG C
19,288	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0300	0.1		**Sheet Flow, A TO B** Grass: Dense n= 0.240 P2= 3.00"
0.6	50	0.0050	1.4		**Shallow Concentrated Flow, B TO C** Paved Kv= 20.3 fps
4.1	70	Total			

Subcatchment A2: AVESTA SUBCATCHMENT A2

Runoff = 0.85 cfs @ 12.01 hrs, Volume= 0.052 af, Depth= 3.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
2,637	74	>75% Grass cover, Good, HSG C
4,908	98	Paved parking & roofs
7,545	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	40	0.0175	1.1		**Sheet Flow, A TO B** Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment A3: AVESTA SUBCATCHMENT A3

Runoff = 0.41 cfs @ 12.00 hrs, Volume= 0.028 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
3,222	98	Paved parking & roofs

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	22	0.0830	1.7		**Sheet Flow, A TO B** Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment OS: Off-site Drainage Area

Runoff = 13.16 cfs @ 12.14 hrs, Volume= 1.075 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
205,821	65	Brush, Good, HSG C
68,607	98	Paved parking & roofs
274,428	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.0700	0.3		**Sheet Flow, SHEET** Range n= 0.130 P2= 3.00"
3.4	375	0.0700	1.9		**Shallow Concentrated Flow, Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
0.8	492	0.0250	10.3	18.59	**Channel Flow, Pipe Flow** Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
9.7	967	Total			

Subcatchment V1: VLF SUBCATCHMENT 1

Runoff = 23.78 cfs @ 12.11 hrs, Volume= 1.822 af, Depth= 3.38"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
183,899	98	Paved parking & roofs
58,945	74	>75% Grass cover, Good, HSG C
4,874	80	>75% Grass cover, Good, HSG D
33,687	61	>75% Grass cover, Good, HSG B
281,405	88	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	40	0.0700	0.2		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.00"
3.9	340	0.0050	1.4		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
0.8	510	0.0300	11.3	20.36	**Channel Flow, C-D** Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
7.6	890	Total			

Subcatchment V2: VLF - POST 2

Runoff = 7.08 cfs @ 12.05 hrs, Volume= 0.460 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
7,927	98	Paved parking & roofs
96,092	74	>75% Grass cover, Good, HSG C
4,849	61	>75% Grass cover, Good, HSG B
108,868	75	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	30	0.0670	0.2		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.00"
1.0	157	0.1270	2.5		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
3.4	187	Total			

Reach 1R: Avesta Reach 1

Inflow Area = 0.443 ac, Inflow Depth = 3.59"
Inflow = 1.93 cfs @ 12.06 hrs, Volume= 0.132 af
Outflow = 1.92 cfs @ 12.07 hrs, Volume= 0.132 af, Atten= 1%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.8 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.3 fps, Avg. Travel Time= 1.2 min

Peak Depth= 0.62'
Capacity at bank full= 2.73 cfs
Inlet Invert= 117.80', Outlet Invert= 117.36'
12.0" Diameter Pipe n= 0.012 Length= 88.0' Slope= 0.0050 '/'

Reach 2R: Avesta Reach 2

Inflow Area = 0.616 ac, Inflow Depth = 3.59"
Inflow = 2.51 cfs @ 12.06 hrs, Volume= 0.184 af
Outflow = 2.51 cfs @ 12.06 hrs, Volume= 0.184 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.3 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.8 fps, Avg. Travel Time= 0.4 min

Peak Depth= 0.58'
Capacity at bank full= 3.90 cfs
Inlet Invert= 117.10', Outlet Invert= 116.64'
12.0" Diameter Pipe n= 0.012 Length= 45.0' Slope= 0.0102 '/'

Reach 3R: Avesta Reach 3

Inflow Area = 0.690 ac, Inflow Depth = 3.68"
Inflow = 2.78 cfs @ 12.06 hrs, Volume= 0.212 af
Outflow = 2.78 cfs @ 12.06 hrs, Volume= 0.212 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.1 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.5 fps, Avg. Travel Time= 0.6 min

Peak Depth= 0.45'
Capacity at bank full= 6.62 cfs
Inlet Invert= 116.20', Outlet Invert= 113.67'
12.0" Diameter Pipe n= 0.012 Length= 86.0' Slope= 0.0294 '/'

Reach EX: Existing Culvert

Inflow Area = 6.300 ac, Inflow Depth = 2.05"
Inflow = 13.16 cfs @ 12.14 hrs, Volume= 1.075 af
Outflow = 5.98 cfs @ 12.01 hrs, Volume= 1.075 af, Atten= 55%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.7 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.9 fps, Avg. Travel Time= 0.4 min

Peak Depth= 1.50'
Capacity at bank full= 5.69 cfs
18.0" Diameter Pipe n= 0.024 Length= 45.0' Slope= 0.0100 '/'

Reach SD-31: Storm Drain

Inflow Area = 12.760 ac, Inflow Depth = 0.51"
Inflow = 0.38 cfs @ 12.11 hrs, Volume= 0.539 af
Outflow = 0.38 cfs @ 12.12 hrs, Volume= 0.539 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.0 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.5 fps, Avg. Travel Time= 0.3 min

Peak Depth= 0.24'
Capacity at bank full= 0.78 cfs
Inlet Invert= 97.80', Outlet Invert= 97.00'
6.0" Diameter Pipe n= 0.012 Length= 48.0' Slope= 0.0167 '/'

Reach SD-32: Storm Drain

Inflow = 22.29 cfs @ 12.20 hrs, Volume= 2.358 af
Outflow = 22.28 cfs @ 12.20 hrs, Volume= 2.358 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.1 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.2 fps, Avg. Travel Time= 0.3 min

Peak Depth= 1.77'
Capacity at bank full= 55.02 cfs
Inlet Invert= 98.12', Outlet Invert= 98.00'
48.0" Diameter Pipe n= 0.024 Length= 24.0' Slope= 0.0050 '/'

Pond A: Avesta Underground Storage

Inflow Area = 0.690 ac, Inflow Depth = 3.26"
Inflow = 2.78 cfs @ 12.06 hrs, Volume= 0.188 af
Outflow = 0.36 cfs @ 12.61 hrs, Volume= 0.167 af, Atten= 87%, Lag= 33.0 min
Primary = 0.36 cfs @ 12.61 hrs, Volume= 0.167 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 112.44' Storage= 4,338 cf
Plug-Flow detention time= 323.1 min calculated for 0.167 af (89% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	1,798	1,798
112.00	1,798	3,596
113.00	1,698	5,294
113.50	100	5,394

Primary OutFlow Max=0.36 cfs @ 12.61 hrs HW=112.44' (Free Discharge)
↑—**1=Orifice/Grate** (Controls 0.14 cfs)
└—**2=Orifice/Grate** (Controls 0.22 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	110.50'	**2.0" Vert. Orifice/Grate** C= 0.600
2	Primary	112.00'	**4.0" Vert. Orifice/Grate** C= 0.600

Pond BP: BYPASS

Inflow = 29.07 cfs @ 12.11 hrs, Volume= 2.358 af
Outflow = 22.29 cfs @ 12.20 hrs, Volume= 2.358 af, Atten= 23%, Lag= 5.3 min
Primary = 22.29 cfs @ 12.20 hrs, Volume= 2.358 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 103.53' Storage= 15,182 cf
Plug-Flow detention time= 17.4 min calculated for 2.358 af (100% of inflow)

Elevation (feet)	Cum.Store (cubic-feet)
98.50	0
99.00	678
99.50	1,860
100.00	3,318
100.50	4,950
101.00	6,690
101.50	8,484
102.00	10,302
102.50	12,012
103.00	13,650
103.50	15,108
104.00	16,290
104.50	16,962

Primary OutFlow Max=22.29 cfs @ 12.20 hrs HW=103.53' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Orifice/Grate** (Controls 5.64 cfs)
- **3=Orifice/Grate** (Controls 16.64 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	104.50'	**8.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
2	Primary	98.50'	**10.0" Vert. Orifice/Grate** C= 0.600
3	Primary	100.90'	**22.0" Vert. Orifice/Grate** C= 0.600

Pond IR: Avesta Isolator Row

Inflow Area =	0.690 ac, Inflow Depth = 3.68"		
Inflow =	2.78 cfs @ 12.06 hrs, Volume=	0.212 af	
Outflow =	2.78 cfs @ 12.06 hrs, Volume=	0.188 af, Atten= 0%, Lag= 0.0 min	
Primary =	2.78 cfs @ 12.06 hrs, Volume=	0.188 af	

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 113.88' Storage= 1,055 cf
Plug-Flow detention time= 85.7 min calculated for 0.188 af (89% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	350	350
112.00	350	700
113.00	300	1,000
113.50	50	1,050
114.00	6	1,056
115.00	6	1,062
116.00	6	1,068
118.00	6	1,074

Primary OutFlow Max=2.76 cfs @ 12.06 hrs HW=113.88' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 2.76 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	113.50'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Pond UG: UNDERGROUND DETENTION V1

Inflow Area =	12.760 ac, Inflow Depth = 2.72"		
Inflow =	29.47 cfs @ 12.11 hrs, Volume=	2.897 af	
Outflow =	29.45 cfs @ 12.11 hrs, Volume=	2.897 af, Atten= 0%, Lag= 0.3 min	
Primary =	0.38 cfs @ 12.11 hrs, Volume=	0.539 af	
Secondary =	29.07 cfs @ 12.11 hrs, Volume=	2.358 af	

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 104.46' Storage= 6,635 cf
Plug-Flow detention time= 44.6 min calculated for 2.897 af (100% of inflow)

Elevation (feet)	Cum.Store (cubic-feet)
100.50	0
100.75	175
101.00	482
101.25	864
101.50	1,304
101.75	1,781
102.00	2,279
102.25	2,804
102.50	3,328
102.75	3,858
103.00	4,378
103.25	4,881
103.50	5,358
103.75	5,798
104.00	6,180
104.25	6,487
104.50	6,662

Primary OutFlow Max=0.38 cfs @ 12.11 hrs HW=104.46' (Free Discharge)
↑—**1=Orifice/Grate** (Controls 0.38 cfs)

Secondary OutFlow Max=29.05 cfs @ 12.11 hrs HW=104.46' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 29.05 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	100.50'	**2.7" Vert. Orifice/Grate** C= 0.600
2	Secondary	103.40'	**8.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Link SP1: Analysis Point 4

Inflow Area = 15.949 ac, Inflow Depth = 2.65"
Inflow = 26.07 cfs @ 12.19 hrs, Volume= 3.524 af
Primary = 26.07 cfs @ 12.19 hrs, Volume= 3.524 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Type III 24-hr Rainfall=5.50"
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A1: AVESTA SUBCATCHMENT A1 Runoff Area=19,288 sf Runoff Depth=4.36"
Length=70' Tc=4.1 min CN=90 Runoff= 2.32 cfs 0.161 af

Subcatchment A2: AVESTA SUBCATCHMENT A2 Runoff Area=7,545 sf Runoff Depth=4.36"
Length=40' Tc=0.6 min CN=90 Runoff= 1.03 cfs 0.063 af

Subcatchment A3: AVESTA SUBCATCHMENT A3 Runoff Area=3,222 sf Runoff Depth=5.26"
Length=22' Tc=0.2 min CN=98 Runoff= 0.48 cfs 0.032 af

Subcatchment OS: Off-site Drainage Area Runoff Area=274,428 sf Runoff Depth=2.68"
Length=967' Tc=9.7 min CN=73 Runoff= 17.37 cfs 1.406 af

Subcatchment V1: VLF SUBCATCHMENT 1 Runoff Area=281,405 sf Runoff Depth=4.15"
Length=890' Tc=7.6 min CN=88 Runoff= 28.87 cfs 2.232 af

Subcatchment V2: VLF - POST 2 Runoff Area=108,868 sf Runoff Depth=2.86"
Length=187' Tc=3.4 min CN=75 Runoff= 9.21 cfs 0.596 af

Reach 1R: Avesta Reach 1 Peak Depth= 0.71' Max Vel= 3.9 fps Inflow= 2.32 cfs 0.161 af
D=12.0" n=0.012 L=88.0' S=0.0050 '/' Capacity=2.73 cfs Outflow= 2.31 cfs 0.161 af

Reach 2R: Avesta Reach 2 Peak Depth= 0.66' Max Vel= 5.5 fps Inflow= 3.02 cfs 0.224 af
D=12.0" n=0.012 L=45.0' S=0.0102 '/' Capacity=3.90 cfs Outflow= 3.02 cfs 0.224 af

Reach 3R: Avesta Reach 3 Peak Depth= 0.50' Max Vel= 8.4 fps Inflow= 3.34 cfs 0.256 af
D=12.0" n=0.012 L=86.0' S=0.0294 '/' Capacity=6.62 cfs Outflow= 3.34 cfs 0.256 af

Reach EX: Existing Culvert Peak Depth= 1.50' Max Vel= 3.7 fps Inflow= 17.37 cfs 1.406 af
D=18.0" n=0.024 L=45.0' S=0.0100 '/' Capacity=5.69 cfs Outflow= 6.04 cfs 1.406 af

Reach SD-31: Storm Drain Peak Depth= 0.25' Max Vel= 4.0 fps Inflow= 0.38 cfs 0.558 af
D=6.0" n=0.012 L=48.0' S=0.0167 '/' Capacity=0.78 cfs Outflow= 0.38 cfs 0.558 af

Reach SD-32: Storm Drain Peak Depth= 1.99' Max Vel= 4.4 fps Inflow= 27.31 cfs 3.080 af
D=48.0" n=0.024 L=24.0' S=0.0050 '/' Capacity=55.02 cfs Outflow= 27.30 cfs 3.080 af

Pond A: Avesta Underground Storage Peak Storage= 5,227 cf @ 112.96' Inflow= 3.34 cfs 0.232 af
Primary= 0.54 cfs 0.211 af Outflow= 0.54 cfs 0.211 af

Pond BP: BYPASS Peak Storage= 17,047 cf @ 104.56' Inflow= 34.14 cfs 3.080 af
Primary= 27.31 cfs 3.080 af Outflow= 27.31 cfs 3.080 af

Pond IR: Avesta Isolator Row Peak Storage= 1,055 cf @ 113.93' Inflow= 3.34 cfs 0.256 af
Primary= 3.34 cfs 0.232 af Outflow= 3.34 cfs 0.232 af

Pond UG: UNDERGROUND DETENTION V1 Peak Storage= 6,721 cf @ 104.58' Inflow= 34.56 cfs 3.638 af
Primary= 0.38 cfs 0.558 af Secondary= 34.14 cfs 3.080 af Outflow= 34.53 cfs 3.638 af

Link SP1: Analysis Point 4 Inflow= 32.42 cfs 4.445 af
Primary= 32.42 cfs 4.445 af

Total Runoff Area = 15.949 ac Runoff Volume = 4.490 af Average Runoff Depth = 3.38"

Subcatchment A1: AVESTA SUBCATCHMENT A1

Runoff = 2.32 cfs @ 12.06 hrs, Volume= 0.161 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
12,589	98	Paved parking & roofs
6,699	74	>75% Grass cover, Good, HSG C
19,288	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0300	0.1		**Sheet Flow, A TO B** Grass: Dense n= 0.240 P2= 3.00"
0.6	50	0.0050	1.4		**Shallow Concentrated Flow, B TO C** Paved Kv= 20.3 fps
4.1	70	Total			

Subcatchment A2: AVESTA SUBCATCHMENT A2

Runoff = 1.03 cfs @ 12.01 hrs, Volume= 0.063 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
2,637	74	>75% Grass cover, Good, HSG C
4,908	98	Paved parking & roofs
7,545	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	40	0.0175	1.1		**Sheet Flow, A TO B** Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment A3: AVESTA SUBCATCHMENT A3

Runoff = 0.48 cfs @ 12.00 hrs, Volume= 0.032 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
3,222	98	Paved parking & roofs

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	22	0.0830	1.7		**Sheet Flow, A TO B** Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment OS: Off-site Drainage Area

Runoff = 17.37 cfs @ 12.14 hrs, Volume= 1.406 af, Depth= 2.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
205,821	65	Brush, Good, HSG C
68,607	98	Paved parking & roofs
274,428	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.0700	0.3		**Sheet Flow, SHEET** Range n= 0.130 P2= 3.00"
3.4	375	0.0700	1.9		**Shallow Concentrated Flow, Shallow Conc. Flow** Short Grass Pasture Kv= 7.0 fps
0.8	492	0.0250	10.3	18.59	**Channel Flow, Pipe Flow** Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
9.7	967	Total			

Subcatchment V1: VLF SUBCATCHMENT 1

Runoff = 28.87 cfs @ 12.11 hrs, Volume= 2.232 af, Depth= 4.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
183,899	98	Paved parking & roofs
58,945	74	>75% Grass cover, Good, HSG C
4,874	80	>75% Grass cover, Good, HSG D
33,687	61	>75% Grass cover, Good, HSG B
281,405	88	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	40	0.0700	0.2		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.00"
3.9	340	0.0050	1.4		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
0.8	510	0.0300	11.3	20.36	**Channel Flow, C-D** Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
7.6	890	Total			

Subcatchment V2: VLF - POST 2

Runoff = 9.21 cfs @ 12.05 hrs, Volume= 0.596 af, Depth= 2.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
7,927	98	Paved parking & roofs
96,092	74	>75% Grass cover, Good, HSG C
4,849	61	>75% Grass cover, Good, HSG B
108,868	75	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	30	0.0670	0.2		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.00"
1.0	157	0.1270	2.5		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
3.4	187	Total			

Reach 1R: Avesta Reach 1

Inflow Area = 0.443 ac, Inflow Depth = 4.36"
Inflow = 2.32 cfs @ 12.06 hrs, Volume= 0.161 af
Outflow = 2.31 cfs @ 12.07 hrs, Volume= 0.161 af, Atten= 1%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.9 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.3 fps, Avg. Travel Time= 1.1 min

Peak Depth= 0.71'
Capacity at bank full= 2.73 cfs
Inlet Invert= 117.80', Outlet Invert= 117.36'
12.0" Diameter Pipe n= 0.012 Length= 88.0' Slope= 0.0050 '/'

Reach 2R: Avesta Reach 2

Inflow Area = 0.616 ac, Inflow Depth = 4.36"
Inflow = 3.02 cfs @ 12.06 hrs, Volume= 0.224 af
Outflow = 3.02 cfs @ 12.06 hrs, Volume= 0.224 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.5 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.9 fps, Avg. Travel Time= 0.4 min

Peak Depth= 0.66'
Capacity at bank full= 3.90 cfs
Inlet Invert= 117.10', Outlet Invert= 116.64'
12.0" Diameter Pipe n= 0.012 Length= 45.0' Slope= 0.0102 '/'

Reach 3R: Avesta Reach 3

Inflow Area = 0.690 ac, Inflow Depth = 4.46"
Inflow = 3.34 cfs @ 12.06 hrs, Volume= 0.256 af
Outflow = 3.34 cfs @ 12.06 hrs, Volume= 0.256 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.4 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.6 fps, Avg. Travel Time= 0.5 min

Peak Depth= 0.50'
Capacity at bank full= 6.62 cfs
Inlet Invert= 116.20', Outlet Invert= 113.67'
12.0" Diameter Pipe n= 0.012 Length= 86.0' Slope= 0.0294 '/'

Reach EX: Existing Culvert

Inflow Area = 6.300 ac, Inflow Depth = 2.68"
Inflow = 17.37 cfs @ 12.14 hrs, Volume= 1.406 af
Outflow = 6.04 cfs @ 11.95 hrs, Volume= 1.406 af, Atten= 65%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.7 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.0 fps, Avg. Travel Time= 0.4 min

Peak Depth= 1.50'
Capacity at bank full= 5.69 cfs
18.0" Diameter Pipe n= 0.024 Length= 45.0' Slope= 0.0100 '/'

Reach SD-31: Storm Drain

Inflow Area = 12.760 ac, Inflow Depth = 0.53"
Inflow = 0.38 cfs @ 12.11 hrs, Volume= 0.558 af
Outflow = 0.38 cfs @ 12.12 hrs, Volume= 0.558 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.0 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.5 fps, Avg. Travel Time= 0.3 min

Peak Depth= 0.25'
Capacity at bank full= 0.78 cfs
Inlet Invert= 97.80', Outlet Invert= 97.00'
6.0" Diameter Pipe n= 0.012 Length= 48.0' Slope= 0.0167 '/'

Reach SD-32: Storm Drain

Inflow = 27.31 cfs @ 12.19 hrs, Volume= 3.080 af
Outflow = 27.30 cfs @ 12.19 hrs, Volume= 3.080 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.4 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.3 fps, Avg. Travel Time= 0.3 min

Peak Depth= 1.99'
Capacity at bank full= 55.02 cfs
Inlet Invert= 98.12', Outlet Invert= 98.00'
48.0" Diameter Pipe n= 0.024 Length= 24.0' Slope= 0.0050 '/'

Pond A: Avesta Underground Storage

Inflow Area = 0.690 ac, Inflow Depth = 4.04"
Inflow = 3.34 cfs @ 12.06 hrs, Volume= 0.232 af
Outflow = 0.54 cfs @ 12.54 hrs, Volume= 0.211 af, Atten= 84%, Lag= 28.6 min
Primary = 0.54 cfs @ 12.54 hrs, Volume= 0.211 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 112.96' Storage= 5,227 cf
Plug-Flow detention time= 285.4 min calculated for 0.211 af (91% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	1,798	1,798
112.00	1,798	3,596
113.00	1,698	5,294
113.50	100	5,394

Primary OutFlow Max=0.54 cfs @ 12.54 hrs HW=112.96' (Free Discharge)
↑—**1=Orifice/Grate** (Controls 0.16 cfs)
└—**2=Orifice/Grate** (Controls 0.37 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	110.50'	**2.0" Vert. Orifice/Grate** C= 0.600
2	Primary	112.00'	**4.0" Vert. Orifice/Grate** C= 0.600

Pond BP: BYPASS

Inflow = 34.14 cfs @ 12.11 hrs, Volume= 3.080 af
Outflow = 27.31 cfs @ 12.19 hrs, Volume= 3.080 af, Atten= 20%, Lag= 4.6 min
Primary = 27.31 cfs @ 12.19 hrs, Volume= 3.080 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 104.56' Storage= 17,047 cf
Plug-Flow detention time= 16.7 min calculated for 3.079 af (100% of inflow)

Elevation (feet)	Cum.Store (cubic-feet)
98.50	0
99.00	678
99.50	1,860
100.00	3,318
100.50	4,950
101.00	6,690
101.50	8,484
102.00	10,302
102.50	12,012
103.00	13,650
103.50	15,108
104.00	16,290
104.50	16,962

Primary OutFlow Max=27.62 cfs @ 12.19 hrs HW=104.56' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.33 cfs)
- **2=Orifice/Grate** (Controls 6.24 cfs)
- **3=Orifice/Grate** (Controls 21.05 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	104.50'	**8.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
2	Primary	98.50'	**10.0" Vert. Orifice/Grate** C= 0.600
3	Primary	100.90'	**22.0" Vert. Orifice/Grate** C= 0.600

Pond IR: Avesta Isolator Row

Inflow Area = 0.690 ac, Inflow Depth = 4.46"
Inflow = 3.34 cfs @ 12.06 hrs, Volume= 0.256 af
Outflow = 3.34 cfs @ 12.06 hrs, Volume= 0.232 af, Atten= 0%, Lag= 0.0 min
Primary = 3.34 cfs @ 12.06 hrs, Volume= 0.232 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 113.93' Storage= 1,055 cf
Plug-Flow detention time= 76.1 min calculated for 0.232 af (91% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
110.00	0	0
111.00	350	350
112.00	350	700
113.00	300	1,000
113.50	50	1,050
114.00	6	1,056
115.00	6	1,062
116.00	6	1,068
118.00	6	1,074

Primary OutFlow Max=3.33 cfs @ 12.06 hrs HW=113.93' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 3.33 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	113.50'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Pond UG: UNDERGROUND DETENTION V1

Inflow Area =	12.760 ac,	Inflow Depth =	3.42"	
Inflow =	34.56 cfs @	12.11 hrs,	Volume=	3.638 af
Outflow =	34.53 cfs @	12.11 hrs,	Volume=	3.638 af, Atten= 0%, Lag= 0.3 min
Primary =	0.38 cfs @	12.11 hrs,	Volume=	0.558 af
Secondary =	34.14 cfs @	12.11 hrs,	Volume=	3.080 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 104.58' Storage= 6,721 cf
Plug-Flow detention time= 36.9 min calculated for 3.638 af (100% of inflow)

Elevation (feet)	Cum.Store (cubic-feet)
100.50	0
100.75	175
101.00	482
101.25	864
101.50	1,304
101.75	1,781
102.00	2,279
102.25	2,804
102.50	3,328
102.75	3,858
103.00	4,378
103.25	4,881
103.50	5,358
103.75	5,798
104.00	6,180
104.25	6,487
104.50	6,662

Primary OutFlow Max=0.38 cfs @ 12.11 hrs HW=104.58' (Free Discharge)
└**1=Orifice/Grate** (Controls 0.38 cfs)

Secondary OutFlow Max=34.24 cfs @ 12.11 hrs HW=104.58' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 34.24 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	100.50'	**2.7" Vert. Orifice/Grate** C= 0.600
2	Secondary	103.40'	**8.0' long x 0.5' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32

Link SP1: Analysis Point 4

Inflow Area = 15.949 ac, Inflow Depth = 3.34"
Inflow = 32.42 cfs @ 12.18 hrs, Volume= 4.445 af
Primary = 32.42 cfs @ 12.18 hrs, Volume= 4.445 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Appendix D

Treatment Level Calculations and Plan

NORTHEAST CIVIL SOLUTIONS, INC.
Surveying Engineering Land Planning
153 U.S. Route 1, Scarborough, Maine 04074
Tel: 207-883-1000 • Fax: 207-883-1001

PROJECT VLF
SHEET NO. 1 OF
CALCULATED BY DLC DATE
CHECKED BY DATE
SCALE

STORMWATER TREATMENT CALCULATION

TOTAL LOT AREA = 8.03ac = 349,787 sf

DISTURBED AREA = 329,230 sf

TOTAL IMPERVIOUS AREA ONSITE = 134,593 sf
TOTAL IMPERVIOUS AREA TREATED = 176,891 sf
% AREA TREATED = 95.8 % > 95% REQ'D - OK -

TOTAL DEVELOPED AREA ONSITE 318,777 sf
TOTAL DEVELOPED AREA TREATED = 254,621 sf
% AREA TREATED = 80% ≥ 80% REQ'D - OK -

VIL_RESP03734

HRC – VILLAGE AT LITTLE FALLS
WINDHAM, MAINE

LEGEND

DEVELOPED AREA TO BE TREATED BY STORMFILTER

RESTORE TO NATURAL VEGETATION

VIL_RESP03735

TREATMENT PLAN
FOR DEVELOPED AREA

SC. 1" = 200'

E:\LAND PROJECT\29000\29522-HRC-VILLAGE\PLANSET\29522-DEP--AREAS

HRC – VILLAGE AT LITTLE FALLS
WINDHAM, MAINE

LEGEND

IMPERVIOUS AREA TO BE TREATED BY STORMFILTER

VIL_RESP03736

TREATMENT PLAN FOR IMPERVIOUS AREA

SC. 1" = 200'

E:\LAND PROJECT\29000\29522-HRC-VILLAGE\PLANSET\29522-DEP-AREAS

Appendix E

Treatment Volume and Duration Calculations

NORTHEAST CIVIL SOLUTIONS, INC.
Surveying Engineering Land Planning
153 U.S. Route 1, Scarborough, Maine 04074
Tel: 207-883-1000 • Fax: 207-883-1001

PROJECT VLF
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____

TREATMENT VOLUME & DURATION

SYSTEM MUST TREAT (1" x IMPERVIOUS AREA) + (0.4" x UNCONSERVATIVE AREA)

$$\text{TREATMENT VOLUME} = \left[1'' \times \frac{1'}{12''} \times 189{,}623\right] + \left[0.4'' \times \frac{1'}{12''} \times 108{,}765\right]$$

TREATMENT VOLUME = 19,344 ft³ REQUIRED

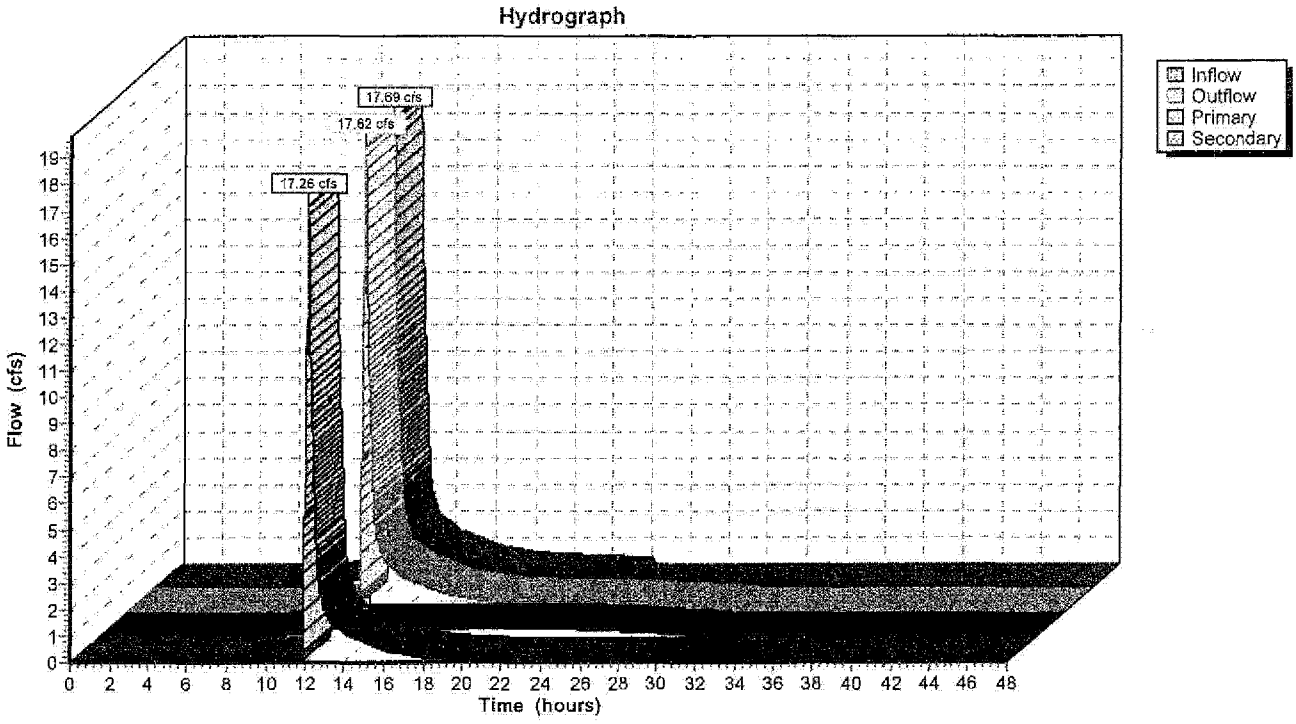
THE ACTUAL VOLUME TREATED IS EQUAL TO THE VOLUME UNDER THE PRIMARY HYDROGRAPH

$V_{provided}$ = [0.01 cfs x 3600 sec/hr x 1 hr] + [0.07 cfs x 3600 sec/hr x 1 hr] +
+ [0.13 cfs x 3600 sec/hr x 1 hr] + [0.19 cfs x 3600 sec/hr x 1 hr] +
+ [0.35 cfs x 3600 sec/hr x 1 hr] + [0.33 cfs x 3600 sec/hr x 3 hr] +
+ [0.32 cfs x 3600 sec/hr x 8 hr] + [0.31 cfs x 3600 sec/hr x 1 hr] +
+ [0.28 cfs x 3600 sec/hr x 1 hr] + [0.22 cfs x 3600 sec/hr x 1 hr] +
+ [0.19 cfs x 3600 sec/hr x 1 hr] + [0.15 cfs x 3600 sec/hr x 1 hr] +
+ [0.10 cfs x 3600 sec/hr x 1 hr] + [0.03 cfs x 3600 sec/hr x 1 hr] +
+ [0.01 cfs x 3600 sec/hr x 1 hr] = 21,024 ft³ of treatment

Since 21,024 ft³ > 19344 ft³ required -OK-

Duration in system is 24 hrs, therefore stormwater is adequately treated prior to discharge

Pond UG: UNDERGROUND DETENTION V1



Hydrograph for Pond UG: UNDERGROUND DETENTION V1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	100.50	0.00	0.00	0.00
1.00	0.00	0	100.50	0.00	0.00	0.00
2.00	0.00	0	100.50	0.00	0.00	0.00
3.00	0.00	0	100.50	0.00	0.00	0.00
4.00	0.00	0	100.50	0.00	0.00	0.00
5.00	0.00	0	100.50	0.00	0.00	0.00
6.00	0.00	0	100.50	0.00	0.00	0.00
7.00	0.00	0	100.50	0.00	0.00	0.00
8.00	0.04	52	100.57	0.01	0.01	0.00
9.00	0.13	195	100.77	0.07	0.07	0.00
10.00	0.29	576	101.06	0.13	0.13	0.00
11.00	0.60	1,546	101.63	0.19	0.19	0.00
12.00	**8.73**	**5,971**	**103.86**	**7.84**	**0.35**	**7.49**
13.00	**2.17**	**5,522**	**103.59**	**2.24**	**0.33**	**1.91**
14.00	1.39	5,415	103.53	1.41	0.33	1.09
15.00	1.06	5,364	103.50	1.08	0.33	0.75
16.00	0.76	5,307	103.47	0.78	0.32	0.46
17.00	0.61	5,272	103.45	0.62	0.32	0.29
18.00	0.47	5,233	103.43	0.48	0.32	0.16
19.00	0.42	5,216	103.43	0.42	0.32	0.10
20.00	0.38	5,204	103.42	0.38	0.32	0.06
21.00	0.35	5,186	103.41	0.35	0.32	0.03
22.00	0.31	5,167	103.40	0.32	0.32	0.00
23.00	0.28	5,096	103.36	0.32	0.32	0.00
24.00	0.25	4,924	103.27	0.31	0.31	0.00
25.00	0.00	3,970	102.80	0.28	0.28	0.00
26.00	0.00	3,006	102.35	0.25	0.25	0.00
27.00	0.00	2,155	101.94	0.22	0.22	0.00
28.00	0.00	1,422	101.56	0.19	0.19	0.00
29.00	0.00	816	101.22	0.15	0.15	0.00
30.00	0.00	359	100.90	0.10	0.10	0.00
31.00	0.00	99	100.64	0.03	0.03	0.00
32.00	0.00	41	100.56	0.01	0.01	0.00
33.00	0.00	25	100.54	0.00	0.00	0.00
34.00	0.00	16	100.52	0.00	0.00	0.00
35.00	0.00	11	100.52	0.00	0.00	0.00
36.00	0.00	7	100.51	0.00	0.00	0.00
37.00	0.00	5	100.51	0.00	0.00	0.00
38.00	0.00	3	100.50	0.00	0.00	0.00
39.00	0.00	2	100.50	0.00	0.00	0.00
40.00	0.00	1	100.50	0.00	0.00	0.00
41.00	0.00	1	100.50	0.00	0.00	0.00
42.00	0.00	1	100.50	0.00	0.00	0.00
43.00	0.00	0	100.50	0.00	0.00	0.00
44.00	0.00	0	100.50	0.00	0.00	0.00
45.00	0.00	0	100.50	0.00	0.00	0.00
46.00	0.00	0	100.50	0.00	0.00	0.00
47.00	0.00	0	100.50	0.00	0.00	0.00
48.00	0.00	0	100.50	0.00	0.00	0.00

Time = 32 hr - 8 hr = 24 hr - ok
V = 21024 cf / 1854 cf - ok

Appendix F

Filter Sizing

NORTHEAST CIVIL SOLUTIONS, INC.
Surveying Engineering Land Planning
153 U.S. Route 1, Scarborough, Maine 04074
Tel: 207-883-1000 • Fax: 207-883-1001

PROJECT VFL
SHEET NO. _____ OF _____
CALCULATED BY DLC DATE _____
CHECKED BY _____ DATE _____
SCALE _____

FILTER SIZING

FILTER RECOMMENDED RATE = 2 GPM / CARTRIDGE
= 0.0044557 cfs / cartridge

MAX FLOW THROUGH SYSTEM = 0.35 cfs

QUANTITY OF CARTRIDGES REQ'D = $0.35 \text{ cfs} \times \frac{1}{0.0044557 \text{ cfs/cartridge}} = 78.5$ cart

- 3 Vaults of 27 cartridges proposed
- Total # of cartridges provided = 81 ok -

Appendix G

Ballast Calculations

NORTHEAST CIVIL SOLUTIONS, INC.
Surveying Engineering Land Planning
153 U.S. Route 1, Scarborough, Maine 04074
Tel: 207-883-1000 • Fax: 207-883-1001

PROJECT VLF
SHEET NO. _____ OF _____
CALCULATED BY DLC DATE _____
CHECKED BY _____ DATE _____
SCALE _____

CHECK IF ADDITIONAL BALLAST IS REQUIRED

PER OAK ENGINEERS TEST PIT DATA, GROUNDWATER ELEV. IS:

B113 - EXISTING GRADE = 99'
GW ENCOUNTERED AT DEPTH = 11'
GW ELEV = 88
BOTTOM OF SYSTEM = 98.5
SINCE GW IS LOWER THAN SYSTEM, NO BALLAST REQ'D

B111 - EXISTING GRADE = 117
GROUNDWATER NOT ENCOUNTERED

B115 - EXISTING GRADE = 102
GW ENCOUNTERED AT DEPTH = 8'
GW ELEV = 94
BOTTOM OF SYSTEM = 98.5
SINCE GW IS LOWER THAN SYSTEM
NO BALLAST IS REQ'D

(REFER TO SECTION 11 FOR TEST PIT BORING LOGS)

VIL_RESP03744

Appendix H

Outlet Protection Calculations

NORTHEAST CIVIL SOLUTIONS, INC.
Surveying Engineering Land Planning
153 U.S. Route 1, Scarborough, Maine 04074
Tel: 207-883-1000 • Fax: 207-883-1001

PROJECT VLF
SHEET NO. _____ OF _____
CALCULATED BY DLC DATE _____
CHECKED BY _____ DATE _____
SCALE _____

EROSION CONTROL AT OUTLET

DISCHARGE FLOW FROM 48" RCP CULVERT IS 22.6 CFS
IS EQUAL TO 22.6 CFS

PER APPROVED OUTLET PROTECTION FROM MAINE EROSION & SEDIMENT CONTROL BMP (3/2003)
D_{50} RIPRAP SIZE = 6"

VIL_RESP03746

OUTLET PROTECTION

FOR A PIPE FLOWING FULL WITH LOW TAILWATER

RIPRAP SIZE - D50 (inches)

DISCHARGE	PIPE DIAMETER											
	12"	15"	18"	21"	24"	27"	30"	36"	42"	48"	54"	60"
3cfs	4											
5cfs	4											
8cfs	5	4										
10cfs	6	5	4									
12cfs	8	6	6									
15cfs	8	6	8	5								
17cfs		8	8	5								
20cfs		10	10	6	5							
25cfs		12	12	6	6							
30cfs				8	8	6						
40cfs				12	10	8	6					
50cfs				16	12	10	8	6				
60cfs				18	16	12	10	8				
70cfs					18	15	12	8				
80cfs					20	16	15	10	8			
90cfs						18	16	12	10			
100cfs						20	18	12	10			
125cfs						24	20	16	12	10		
150cfs							24	20	16	12	10	
200cfs								24	20	18	15	12

MINIMUM LENGTH OF APRON (FEET)

DISCHARGE	PIPE DIAMETER											
	12"	15"	18"	21"	24"	27"	30"	36"	42"	48"	54"	60"
3cfs	8											
5cfs	8											
8cfs	11	10										
10cfs	14	12	10									
15cfs	18	16	14	12								
20cfs		18	18	16	12							
30cfs			22	20	18	16						
40cfs			26	24	24	20	18					
50cfs				26	26	24	22	18				
70cfs					30	30	28	25				
100cfs						36	36	33	27			
150cfs						42	42	42	38	33	28	
200cfs								48	45	42	37	32

From USDA Soild Conservation Service

Appendix I

Maintenance Contract

Environmental Services, Inc.
17 Main Street
South Portland ME 04106
207.799.8111
207.799.0349

March 7,2007

Denise Cameron
Project Engineer
Northeast Civil solutions
153 U.S. Route 1
Scarborough, ME 04074

Dear Denise:

Clean Harbors Environmental Services, Inc. (CHES) is pleased to submit the following quotation to provide inspection and maintenance service for the proposed storm water maintenance system associated with the Village at little Falls project located in Windham.

Scope of Work

A CHES crew will inspect the unit every six month for the first year of operation until the sediment load is determined. The unit will then be inspected annually and serviced as needed. After each inspection a written report will be sent detailing the condition of the system. When service is needed it will be set up under the direction of a designated representative of the condominium association.

Pricing

Inspections
Labor, equipment, & materials.....$150.00/trip

Cleaning
Labor, equipment & materials.....$1,300.00/trip

Transportation and disposal

Waste water.....$0.20/gal $150.00mini/load
Sediment & debris.....$55.00/ton 2ton mini/load
Transportation.....$300.00/trip
Note: oily contaminated water.....$0.50/gal

Pricing is pending profile approval and does not include any applicable hazardous waste charges.

General Conditions

1. Prices firm for 30 days.
2. Terms: Net 15 days, upon approved credit.
3. Applicable sales tax and state regulatory fees are not included in quoted prices.
4. Materials subject to additional charges if they do not conform to the listed specifications.
5. All drums for disposal must be in D.O.T. approved containers and in good condition.
6. All containers must be marked with a Clean harbors profile number.
7. A variable Energy and Security recovery Fee (that fluctuates with the DOE national average diesel price), currently at 9.5% will be applied to the total invoice.

Any work performed by CHES personnel will be in strict compliance with OSHA Regulations and Clean Harbors Safety Standards. All disposals performed by CHES personnel will be done in strict compliance with state and federal regulations.

Thank you for the opportunity to continue working with you and we look forward to doing business with you in the future. If you have any questions, please feel free to contact me at (207) 799-8111 ext.347.

Sincerely,

John J. Swiger
Field Specialist
Swigerj@cleanharbors.com

Acknowledgement

Your signature below indicates your acceptance of the pricing and terms detailed in the quotation above. Thank you for the opportunity to be of service.

Signature Stephen A Etzel V. Pres. Purchase order number

VIL_RESP03750

Appendix J

Sample Maintenance Log

Village at Little Falls

BMP MAINTENANCE LOG

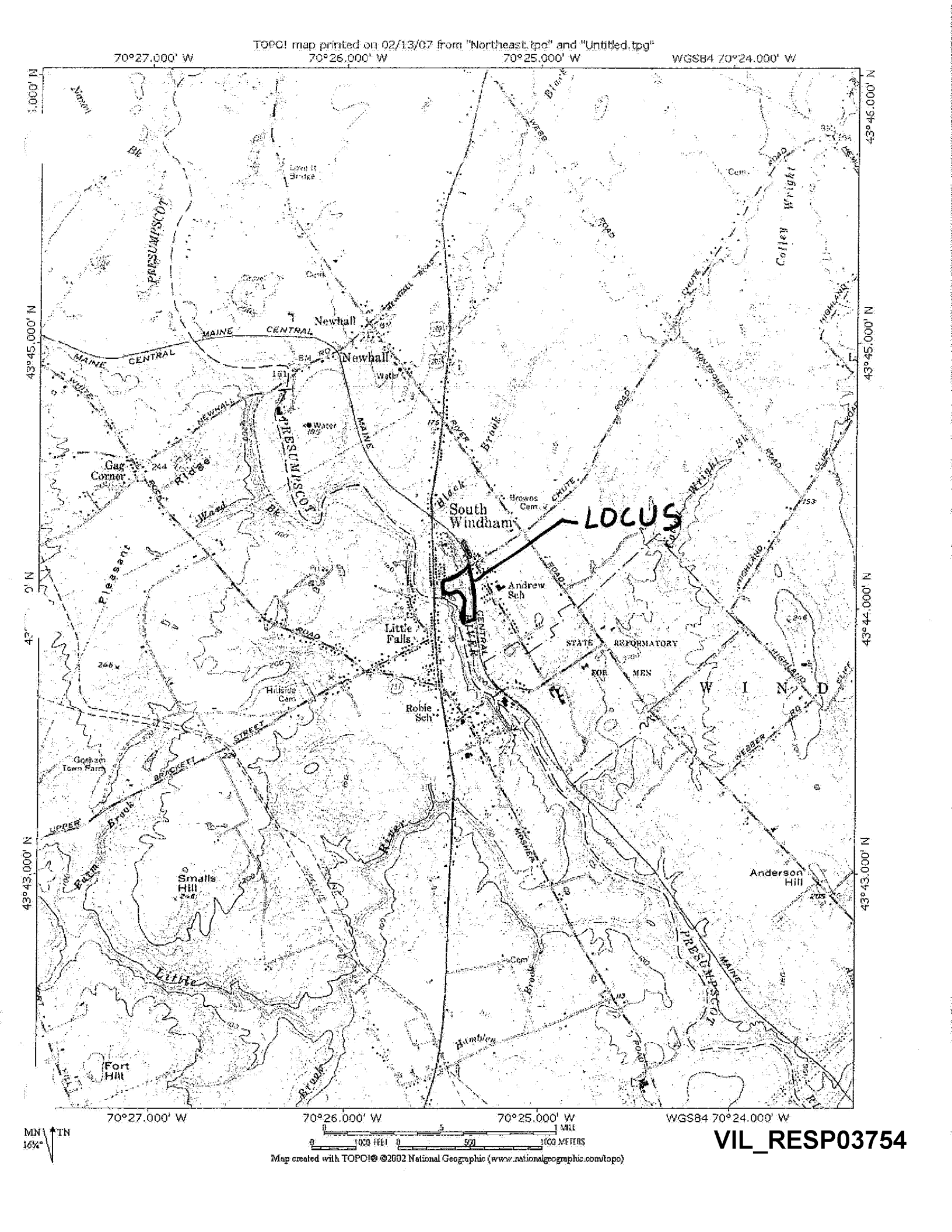
PAGE____

BMP STRUCTURE	INSPECTOR (NAME)	WORK PERFORMED	DATE PERFORMED	COMMENTS
Roadway Sweeping				
Filtration System				
Underground Detention System				
Catchbasins and Drainage Pipes				
Culvert Aprons				
Other				
Additional Comments:				

VIL_RESP03752

Appendix K

Maps



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VIL_RESP0375

Appendix L

Condominium Association Documentation

DECLARATION OF VILLAGE AT LITTLE FALLS CONDOMINIUM

****

TABLE OF CONTENTS

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DECLARATION OF VILLAGE AT LITTLE FALLS CONDOMINIUM

ARTICLE 1
DECLARATION OF CONDOMINIUM PROPERTY

THIS DECLARATION OF VILLAGE AT LITTLE FALLS CONDOMINIUM ("Declaration") is executed by **HRC-VILLAGE AT LITTLE FALLS, LLC**, a Maine limited liability company with a mailing address of 2 Market Street, Portland, Maine 04101 ("Declarant"), pursuant to the Maine Condominium Act, chapter 31 of Title 33 of the Maine Revised Statutes of 1964, as amended ("Condominium Act").

§1.1 Declaration of Property. The Declarant as the owner in fee simple of the land located on Depot Street in the Town of Windham, County of Cumberland and State of Maine described in **Exhibit A**, the buildings and improvements now or hereafter located thereon and subject to and together with all easements, rights, privileges and appurtenances thereto (collectively the "Property"), HEREBY SUBMITS the Property to the Condominium Act in accordance with this Declaration, and establishes a condominium as defined in Section 1601-103(7) of the Condominium Act ("Condominium") known as Village at Little Falls Condominium. The name of the Unit Owners' association is the Village at Little Falls Association, a Maine nonprofit corporation (the "Association"). Initially, the Condominium consists of the Property and the initial unit known as Unit # ___ [to be determined].

As set forth in this Declaration, the Declarant reserves various Development Rights, Special Declarant Rights and easements, including without limitation the right to physically construct and legally create a total of up to eighty five (85) Condominium Units with associated Common Elements.

§1.2 Applicability. This Declaration shall govern the Property. All present and future owners, occupants and tenants, their guests, licensees, invitees, employees, agents, and any other person entering on the Property shall be subject to this Declaration, the Bylaws of the Association and to such Rules and Regulations of the Association, all of which shall be deemed to be covenants running with the land, and shall bind any person having at any time any interest in or entering upon the Property.

§1.3 Defined Terms. Capitalized terms not otherwise defined in this Declaration or on the Plat and Plans shall have the meanings specified in the Condominium Act.

§1.4 Interpretation. In the event of any conflict or discrepancy between this Declaration, the Bylaws, the Rules and Regulations, and the Plat and Plans, the provisions of this Declaration shall govern.

ARTICLE 2
DESCRIPTION OF PROPERTY

§2.1 Description of the Property. A legal description of the Property included in the Condominium is set forth in **Exhibit A**. The location and dimensions of the Property initially included in the Condominium are depicted on the Condominium Plat entitled "Condominium Plat of Village at Little Falls" dated _____, 2007 as amended through

VIL_RESP03760

_____, 2006 by ---------- recorded in said Registry of Deeds in Plan Book _____, Page _____ (the "Plat"), a reduced copy of which is attached hereto as **Exhibit B**.

§2.2 Location and Dimensions of Buildings and Units. The term "Building" means any building erected or to be erected on the Property containing one or more Units, as well as other improvements comprising a part of a building or intended to be used for purposes incidental to the use of a building. The proposed location and dimensions of the Buildings and other improvements which may be erected on the Property, including Common Elements, are shown on the Plat as depicted on Exhibit B.

The proposed location and dimensions of initial and proposed Unit together with its appurtenant Limited Common Elements are depicted on the Floor Plans entitled "Village at Little Falls" dated _____, 2006 by _____ and recorded in said Registry of Deeds in Plan Book _____, Page _____ (the "Plans"), reduced copies of which are attached hereto as **Exhibit C.** The proposed location and dimensions of each Building and Unit are subject to change by the Declarant until such time as each Unit is legally created, and such improvements need not be built or may be built with configurations and locations different than those shown on the Plat and Plans, as further appears in Article 5 below.

§2.3 Recorded Plat and Plans. The original Plat and Plans and any amendments thereto shall be recorded with this Declaration in the Cumberland County Registry of Deeds.

§2.4 Condominium Documents. "Condominium Documents" means this Declaration, the Plat, the Plans, the Bylaws of the Association, and the Rules and Regulations adopted by the Board of Directors, and any amendments to any of the foregoing adopted from time to time.

ARTICLE 3
CONDOMINIUM UNITS

§3.1 Creation of Subsequent Units. Initially Unit #____ is created under this Declaration. The Declarant has the right to create up to eighty-four (84) additional Units. For each Unit subsequently created pursuant to this Declaration, its Allocated Interests shall be set forth in an amendment to **Exhibit D**, and a description of such Unit including each Unit's identifying number, the locations and dimensions of the vertical boundaries and horizontal boundaries of each Unit, the Common Elements to which the Unit has direct access, and any other information necessary to identify the Unit shall be shown on the Plat and Plans.

§3.2 Description of the Units. "Unit" means a part of the Property designated for separate ownership or occupancy which has a direct exit to Limited Common Elements and Common Elements. For each Unit created from time to time pursuant to this Declaration, the identification number and approximate area are shown on the Plat and Plans of the Property as amended from time to time. Any Unit's internal room configuration shown on the Plans is illustrative only, and is not binding on an owner except that the structural support of the Building must be preserved.

Each Unit includes the following items:

VIL_RESP03761

(a) All interior partitions (excepting those portions thereof which are load-bearing), interior doors and interior stairways located wholly within the Unit;

(b) Finish flooring, floor coverings, carpeting and the like, and finish wall and ceiling coverings (including paint, wallpaper, furring, gypsum board, moldings, and any other materials constituting any part of the finished surfaces thereof);

(c) Windows, exterior doors and garage doors providing access to the Common Elements including their locks, hardware, tracks, and glass, but excluding their frames, thresholds and sills;

(d) Plumbing, kitchen and bathroom pipes, lines and fixtures, the heating and ventilating equipment and vents, kitchen appliances, water heaters, air conditioning systems if any, and components thereof serving only a single Unit, if any, even if located outside of a Unit's boundaries;

(e) Electrical wiring, equipment outlets and lighting devices from the point where the feed wire enters the Unit's circuit breaker distribution box inwards, and portions of electric, water and utility lines, pipes, outside lights, doorbells, conduits, vents, flues, fans, and equipment serving only that Unit, even if located outside of a Unit's general boundaries; and,

(f) The interior of the garage.

A Unit generally does not include the exterior walls, the roofs, rafters, attics and foundations, slabs, land, and any pipes, wires, conduits, flues, ducts, wires, pipes, or other utility lines running through a Unit which serve more than one Unit or which serve the Common Elements or which serve another Unit.

Each Unit and the Common Elements shall have an easement for lateral and subjacent support from every other Unit and the Common Elements, and shall have the easement for encroachments established under Section 1602-114 of the Condominium Act. In addition, each Unit Owner has an unrestricted, perpetual right of ingress and egress to his or her Unit across the Common Elements, which automatically transfers with a transfer of title to the Unit. Any conveyance, encumbrance, judicial sale, or other transfer (whether voluntary or involuntary) of an interest in the Common Elements shall be void unless the Unit to which that Common Element interest is allocated is also transferred.

§3.3 Unit Boundaries. The boundaries of each Unit subsequently created under this Declaration are shown on the Plat and Plans, and shall consist of:

(a) *Horizontal Boundary*: The upper and lower boundaries of each Unit are generally the following boundaries extended to an intersection with the vertical (perimeter) boundaries:

1. Upper Boundary: The planes at the lower surfaces of the floor joists of the attic or Unit located above a Unit, including the upper (outside) side of the gypsum board of the ceiling and any other materials constituting any part of the finished surfaces thereof, if any, extending to the intersection with the vertical boundaries.

2. Lower Boundary: The horizontal plane at the upper surface of the undecorated surface of the concrete floor slabs extending to the intersection with the vertical boundaries.

(b) *Vertical Boundaries*: The vertical boundaries of each Unit shall be the vertical planes at the stud line at the exterior or outer-most surface of the gypsum-board, sheetrock, or other wall materials forming its exterior or common walls, all extended to the intersections with each other and with the horizontal boundaries.

(c) *Interior Finishes*. The Unit shall include all wallboard, plasterboard, plaster, paneling, tiles, wallpaper, paint, wallpaper, finished flooring and any other materials constituting any part of the finished surfaces thereon located within the boundaries of the Unit.

(d) *Interior Space*. All other spaces, interior partitions and other fixtures and improvements within the boundaries of a Unit are a part of the Unit.

§3.4 Allocated Interests. The term "Allocated Interests" means the Common Element Interest, the Common Expense Liability and the voting rights in the Association allocated to each Unit pursuant to this Declaration. The term "Common Element Interest" means the percentage of undivided interest in the Common Elements appurtenant to each Unit. The term "Common Expense Liability" means the allocation to each Unit of the respective liability for Common Expenses. Generally the Common Expense Liability allocated to a Unit is a percentage equal to the Common Element Interest appurtenant to such Unit. The Allocated Interests of each Unit shall be set forth in **Exhibit D**.

The percentage of each Unit's Common Element Interest and Common Expense Liability is allocated by calculating (i) the sum of the number of square feet of heated, above grade living space in the Unit plus the square feet of the portions of the Common Elements abutting such space extending out to the exterior sheathing or for abutting units, the centerline of the wall separating the units relative to (ii) the total square feet of such for all Units which have then been created in the Condominium, (iii) subject to rounding in order to permit ease of administration, provided however that (iv) the percentage stated in Exhibit D (as it may be amended) shall prevail in any event. Open loft areas, below grade areas, basement and garage areas shall not be counted in calculating such percentages.

Each Unit shall each have one vote in the Association on a formula of one vote per Unit to permit equality among Units.

The Association shall have the express power to separately assess "Service Charges" against a Unit and the Owner thereof for services rendered by the Association to or for the benefit of that Unit as set forth in Section 9.6 below.

§3.5 Alterations by Unit Owner. Subject to this Declaration, the Bylaws and the Rules and Regulations of the Association as amended from time to time, a Unit Owner may make nonstructural improvements and alterations within the interior of the Unit. However, no Unit Owner may make any improvements or alterations or do any work whatsoever which would impair the structural integrity or mechanical systems or the walls separating units or life safety

systems of a Building, lessen the support of any portion of the Condominium, or jeopardize the soundness or safety of the Property.

No Unit Owner shall alter any of the Common Elements or paint or otherwise change the appearance of the Common Elements (including without limitation the Limited Common Elements) or paint or otherwise change the exterior appearance of the Unit (including, but not limited to, the exterior surfaces of doors or windows leading to a Common Element or a Limited Common Element) or any other portion of the Condominium, without the prior written approval of the Board of Directors of the Association.

ARTICLE 4
COMMON ELEMENTS, LIMITED COMMON ELEMENTS

§4.1 Common Elements. The term "Common Elements" means the entire Property other than the Units, and includes:

i. The land, together with the benefit of and subject to all the accompanying rights and easements described in Exhibit A, and all landscaping, vegetation, storm water facilities, and drives;

ii. The foundations, concrete floor slab, roof, exterior walls, porches, decks, outside steps, and all structural and load bearing portions of the buildings;

iii. The utility lines, pipes, wires, electrical and transmission wires and conduits, any life safety systems, distribution pipes, storm water systems, and water and sewer utility lines which serve more than one Unit or the Common Elements (excepting lines and equipment owned by public and municipal utilities or which form portions of the Unit as defined above); and

iv. All other parts of the property necessary or convenient to its existence, maintenance and safety or normally in common use, except as otherwise expressly provided in this Declaration.

§4.2 Limited Common Elements. The term "Limited Common Elements" means those portions of the Common Elements where the exclusive use is reserved to one or more, but fewer than all, of the Units in accordance with this Declaration. Limited Common Elements, consist of the following:

i. For each Unit, an exterior driveway, if any, as shown and assigned as Limited Common Elements on the Plat and/or Plans;

ii. The exterior porch and deck areas, if any, shown and assigned as Limited Common Elements on the Plans;

iii. Any door steps, stoops, thresholds, doors and windows and their frames and sills and any other fixture designed to serve a single Unit but located outside its boundary servicing a Unit;

iv. The attic space, if any, above a Unit and for Units located in building which do not have Units located above other Units, the land and concrete slab and foundation below a Unit; and

v. the portions of the Property shown on the Plat and Plans or as described as Limited Common Elements pursuant to Section 1602-102(2) and (4) of the Condominium Act.

The allocation of Limited Common Elements cannot be altered except in compliance with the Condominium Act, and with the written consent of the Owners and Mortgagees of record of the Units affected by the reallocation of Limited Common Elements.

§4.3 Common Elements to Remain Undivided. The Common Element Interest of a Unit shall be inseparable from each Unit, and any conveyance, lease, devise or other disposition and any mortgage or other encumbrance of any Unit shall include the Common Element Interest, whether or not expressly referred to in the instrument making such transfer. The Common Elements shall remain undivided and no action for partition or division of any party shall be permitted, unless otherwise provided by law and permitted by this Declaration.

§4.4 Connection of Units and Limited Common Areas. If the record owners of the subject Unit(s) affirmatively elect, with the written approval of the Board of Directors of the association based on each owner's compliance with the standards set forth hereinafter, all to be evidenced by a recorded instrument duly executed and acknowledged, that portion of the Common Elements located between a Unit and an adjoining Limited Common Element (with the consent of any other Units sharing the same), may be thereby subjected to an easement in favor of each such Unit respectively running to the midpoint of the space between each Unit or to the Limited Common Element for the removal and alteration of any intervening partition and the creation of apertures therein for passage back and forth between the two Units or to the Limited Common Element, and for the installation of stairs, doors, windows and frames appurtenant thereto. The owners shall be strictly liable for any resulting damage. At all times after such election each Unit Owner: shall preserve and maintain the structural integrity and architectural style, the mechanical and utility systems, and the support of all portions of the Property; and shall strictly comply with all fire, building code and other governmental laws, ordinances and requirements. Any such Unit Owner or his respective heirs, mortgagees or assigns, may at any time revoke such election by instrument duly executed and acknowledged served on the other such owners and duly recorded, and thereafter may seal up passageways and/or remove the stairs, doors and their frames, and/or install a permanent wall, floor ceiling or other partitions, at all times preserving the structural integrity, the mechanical and utility systems and support of all portions of the Property. Nothing contained herein shall be deemed to merge or otherwise affect the separate identity, configuration or the boundaries of said Units.

§4.5 Alteration of Common Elements by the Declarant. Until all Units have been sold and the Declarant's obligations under purchase and sale agreements for all Units have been satisfied, the Declarant reserves the right to modify, alter, repair or improve portions of the Common Elements, including without limitation, any equipment, fixtures and appurtenances, and further reserves an easement over the Common Elements in order to discharge its obligations and o exercise any Declarant Rights, whether arising hereunder or under the Condominium Act.

ARTICLE 5
DECLARANT'S RIGHTS AND PHASING

§5.1 Development Rights. The Declarant reserves the rights:

(a) Until the construction, marketing and sale of all Units is completed, including any future Units which may be created hereunder, to locate in the Common Elements and Units of the Property, even though not depicted on the Plat and Plans, and grant and reserve easements and rights-of-way for the installation, maintenance, repair, replacement and inspection of public utility lines, wires, pipes, conduits and facilities servicing or burdening the Property including, but not limited to, water, electric, telephone, cable television, fuel, sewer, and surface and subsurface drainage, provided however that no such easement shall be effective until of record, that no such easements may be granted through Units sold by Declarant to third party who is not a successor Declarant and that the Common Elements shall be promptly restored upon installation and repair;

(b) Until the construction, marketing and sale of all Units is completed, including any future Units which may be created hereunder, to connect with and make use of utility lines, wires, pipes and conduits located on the Property for construction and sales purposes, provided that the Declarant shall be responsible for the cost of services so used;

(c) Until the construction, marketing and sale of all Units is completed, including any future Units which may be created hereunder, to use the Common Elements for ingress and egress, for the construction, reconstruction, maintenance, repair, renovation, replacement or correction of the Units or Common Elements including without limitation the movement and temporary storage of construction materials and equipment, the right of vehicular and pedestrian access, the right to park motor vehicles, and for the installation of signs and lighting for sales and promotional purposes;

(d) Until the construction, marketing and sale of all Units is completed, including any future Units which may be created hereunder, to operate and relocate construction, sales, leasing and management offices; permit prospective tenants, purchasers, lenders, appraisers, and others to visit the offices and use the Common Elements and use unsold Units for construction, sales, leasing and display purposes;

(e) Appoint and remove members of the Board of Directors and Officers of the Association in accordance with Section 6.2 of this Declaration;

(f) Until the construction, marketing and sale of all Units is completed (including any future Units which may be created hereunder), to approve of the creation of easements between a Unit and an adjoining limited common element in accordance with Section 4.4 of the Declaration in accordance with the standards set forth therein;

(g) Until the expiration of any applicable warranty established by law or agreement, the Declarant, its contractors, agents and employees shall have the right of entry into a Unit to perform warranty-related work, whether for the benefit of than Unit or any other Unit;

(h) Until the construction, marketing and sale of all Units is completed, including any future Units which may be created hereunder, to grant easements for public utilities running over, through or under the Common Elements

(i) Those rights established under Sections 3.6 and 4.5 of the Declaration;

(j) Those rights established under the Condominium Act.

The exercise of Development Rights shall be subject to the following restriction:

i) No changes shall be made to the Contract Zone dated June 1, 2005 and recorded in the Cumberland County Registry of Deeds in Book 227112, Page 102 except in accordance with its terms, or in the approvals from the Town of Windham Planning Board, reference being made to the Plan recorded in the Cumberland County Registry of Deeds in Plan Book _____, Page _____ unless any applicable approval is received pursuant to the Town of Windham's Land Use Ordinances to the extent applicable;

ii) No changes shall be made the Maine Department of Environmental Protection's approval dated _____, 2007 unless any applicable approval is received.

§ 5.2 PHASING. Developer reserves the rights but not the obligation until seven (7) years from the date of the recording of this Declaration:

A. To create on the Property a total of up to eighty five (85) Units, Common Elements and Limited Common Elements appurtenant to such Units on the Property as described in the attached Exhibit A, all pursuant to Section 1602-110 of the Condominium Act. Said conversion creating additional Units and Limited Common Elements may be composed of up to six (6) buildings. The projected location and approximate dimensions of the Units and Limited Common Elements for said buildings are shown on the Plat and Plans. Said additional buildings, Units and Limited Common Elements need not be built with the configurations or in the locations as shown on the Plat, and the DECLARANT EXPRESSLY RESERVES THE RIGHT TO VARY SUCH BUILDINGS, UNITS, LIMITED COMMON ELEMENTS AND THEIR LOCATIONS in its discretion, subject to the restrictions set forth in Section 5.1 above. Upon the addition of Units, which may occur in such stages and in such order as the Declarant determines, they shall be fully integrated into the Condominium as if this Declaration had been originally executed and recorded containing the additional Building Phase(s) and the Allocated Interests of the Units shall be reallocated in accordance with the formulas set forth in this Declaration and as more particularly set forth in the amendment adding said Building Phase(s).

All such future Units, Common Elements and Limited Common Elements *shall be* consistent with the initial Units in terms of the quality of construction, general architectural style and principal materials, provided that the Declarant may substitute construction materials and technique of equal or better quality and, upon the addition thereof to the Condominium, must be substantially completed. All restrictions in or created by authority of this Declaration affecting the use, quality or alienation of Units *shall apply* to such Units including, without limitation, the restriction to residential use set forth herein. Declarant need not add said buildings or and said Limited Common Elements to the Condominium and hence said buildings, Units, Common

Elements and Limited Common Elements NEED NOT BE BUILT. All improvements within a future Building Phase must be substantially completed upon the addition to the Condominium. The Declarant must exercise its rights hereunder within seven (7) years of the recording of this Declaration.

B. Upon the addition of such Units to the Condominium, the Allocated Interests of all Units shall be reallocated in accordance with Section 3.4 of this Declaration and Exhibit D shall be amended accordingly.

C. To exercise any rights under this Section, the Declarant shall prepare, execute and record an amendment to the Declaration pursuant to the Condominium Act, which amendment may include a Plat and Plans as required by the Condominium Act to the extent not previously recorded. Said amendment shall become effective upon recording without the consent of any other person.

§5.3 Assignment. All or any part of the rights, powers or reservations of Declarant contained in this Declaration may be assigned by Declarant to any person or entity which will assume the duties and obligations of Declarant related to the rights, powers or reservations assigned. Upon the recording of an assignment of such rights, powers or reservations pursuant to which the assignee assumes the duties and obligations of Declarant related thereto, the assignee shall become a successor Declarant as to such rights, powers or reservations assigned and shall have the same rights and powers and be subject to the same duties and obligations as are given to and assumed by Declarant herein, and Declarant shall be relieved from all liability with respect to the rights, powers, reservations, duties and obligations hereunder which are assumed by the assignee.

§5.4 Amendment, Waiver, Etc.

ARTICLE 5 and Sections 4.4 and 4.5 shall not be amended or waived without the consent of the Declarant duly recorded in said Registry of Deeds.

The rights and benefits of ARTICLE 5 and all other rights of Declarant set forth in this Declaration, the Bylaws or otherwise, as amended from time to time, may be transferred in whole or part by recorded instrument specifically referring to this Section and executed by Declarant and its successor or assignee.

The Declarant shall have the right to waive the Development and Special Declarant Rights reserved hereunder in whole or part by an written instrument provided that such waiver shall only be effective upon recording in said Registry of Deeds and such waiver shall be subject to the limitations of Section 1603-103(d) of the Act regarding Declarant Control of the Association.

ARTICLE 6
CONDOMINIUM ASSOCIATION

§6.1 The Association. The term "Association" means the association of the Unit Owners organized pursuant to Section 1603-101 of the Condominium Act as a nonprofit corporation under the Maine Non Profit Corporation Act. The membership of the Association at all times shall consist exclusively of all Unit Owners, or in the event of a termination of the Condominium as provided in the Condominium Act, of all former Unit Owners entitled to distributions of proceeds, or their heirs, successors or assigns. Persons having an interest in a Unit solely as security for an obligation shall not be considered members.

Each Unit Owner shall automatically become a member of the Association, which membership shall continue as long as she or he continues as a Unit Owner, and upon the termination of the interest in the Condominium, his or her membership and any interest in the assets of the Association shall be automatically transferred and inure to the next Unit Owner or Owners succeeding him in interest.

The Association shall have all the powers granted pursuant to its Bylaws, the Condominium Act and the Maine Non Profit Corporation Act.

§6.2 Board of Directors Powers; Declarant Control Period. Except as otherwise provided in Section 1603-103(b) of the Condominium Act, the Board of Directors may act on behalf of the Association and shall have all of the powers necessary or appropriate for the administration of Association.

During the Declarant Control Period, the Board of Directors shall be composed of three (3) natural persons. The term "Declarant Control Period" means the period which extends from the date of the recording of this Declaration until the earlier of (a) seven (7) years following the conveyance of the first Unit to a Purchaser or (b) sixty (60) days after the conveyance of seventy-five percent (75%) of the Units, other than a conveyance to a successor Declarant. The Declarant shall have the right during the Declarant Control Period to appoint, remove and replace from time to time any and all members of the Board of Directors, and officers of the Association, without the necessity of obtaining resignations. The directors appointed by the Declarant need not be Unit Owners.

Following the expiration of Declarant Control Period, the affairs of the Association shall be governed by a Board of Directors composed of no less than five (5) and no more than eleven (11) natural persons, the exact number of which shall be established by the Bylaws of the Association but which shall not exceed the number of Units which have been created hereunder. Each Unit shall vote as a class for the election of one director. A majority of the members at the Board of Directors shall be Unit Owners or spouses of Unit Owners or in the case of a Unit Owner which is a corporation, limited liability company, partnership, trust or estate or other legal entity, a designated agent thereof.

The transition from Declarant-appointed members of the Board of Directors to the Unit Owners generally shall occur no later than the earlier of (a) sixty (60) days after the conveyance of 75% of the Units to purchasers other than a successor Declarant, or (b) seven (7) years following conveyance of the first Unit to a Purchaser, or (c) at such earlier date as the Declarant in its sole

discretion shall specify. Prior to the expiration of the Declarant Control Period, a transition meeting of the Association and a transition election shall be held at which all of the members of the Board of Directors and officers of the Association appointed by the Declarant shall resign, and the Unit Owners, including the Declarant if the Declarant owns any Units, shall thereupon elect a Board of Directors to act in the place and stead of those resigning.

By written notice duly recorded in said Registry of Deeds specifically referring to this Section, the Declarant may voluntarily surrender the right to appoint and remove officers and members of the Board of Directors prior to the termination of the Declarant Control Period, but in that event the Declarant may require, for the duration of the Declarant Control Period that specified actions of the Association or Board of Directors, as described in a recorded instrument executed by the Declarant, be approved by the Declarant before such action can become effective.

§6.3 **Bylaws**. The initial bylaws of the Association are attached hereto as **Exhibit E**.

§6.4 **Rules and Regulations**. The Board of Directors shall have the power from time to time to adopt, amend and enforce Rules and Regulations relative to the operation, use and occupancy of the Units and the Common Elements, consistent with the provisions of this Declaration, Bylaws and the Condominium Act including, but not limited to, the appointment of such committees and the enactment and enforcement of such enforcement procedures and penalties for violations as the Board of Directors shall deem appropriate. Any such Rules and Regulations shall be adopted or amended, by means of appropriate resolutions duly approved by the Board of Directors. Notice of such Rules and Regulations and any amendment thereto shall be sent to each Owner or occupant of a Unit promptly after the adoption thereof, and shall bind all Owners, their heirs and assigns, any all tenants, invitees, guests and other persons entering upon the Property.

ARTICLE 7
COMMON CHARGES AND ASSESSMENTS

§7.1 **Common Expenses and Service Charges**. The term "Common Expenses" include, but are not limited to, such costs and expenses established by the Condominium Act, by this Declaration, by the Bylaws, or by the Board of Directors in connection with the administration, operation, maintenance and repair of the Condominium and the Property and the rendering to Unit Owners of all related services.

The term "Limited Common Expenses" mean the Common Expenses associated with the maintenance, repair or replacement of a Limited Common Element, which may be assessed against the Unit(s) to which the appurtenant Limited Common Element is assigned in proportion to the relative Common Expense Liabilities of such Unit(s), all as the Board of Directors may periodically establish and determine. If all Units have similar Limited Common Elements, then the Board of Directors may determine that all Units shall pay such expenses in accordance with their Common Expense Liabilities.

The term "Service Charges" shall mean charges for services benefiting fewer than all the Units, which area assessed exclusively against the Unit or Units benefited in accordance with the

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use of such services as permitted by Section 1603-115(c) of the Condominium Act and the Bylaws.

All expenses for the administration, operation, maintenance and repair of the condominium and the Property shall be borne by the Unit Owners, by means of assessments as set forth herein.

§7.2 Allocation and Payment of Assessments of Common Expenses. The total amount of common expenses shall be assessed to the Units as follows.

(a) The Common Expenses that are not otherwise assessed as Limited Common Expenses or Service Charges shall be assessed against all the Units in proportion to the relative Common Expense Liabilities as set forth herein.

(b) If the Board of Directors determine that a Limited Common Expense benefits more than a single Unit in a manner which is not uniform among all Units, then such Limited Common Expense shall be assessed solely against the benefited Unit in proportion to the relative Common Expense liabilities of such Units as between themselves, all as the Board of Directors may periodically determine. If a Limited Common Expense only benefits a single Unit, that Limited Common Expense may be assessed solely against the Unit benefited, as the Board of Directors shall determine.

(c) For electricity, telephone and cable television services if any, each Unit Owner shall promptly pay the bills for such services consumed or used in his or her Unit. Any electricity serving the Common Elements and the expenses of the maintenance, repair and replacement of the water and system shall be assessed to each Unit as a Common Expense, subject of the right of the Association to submeter and then separately charge for water and sewer services supplied to the Units as Service Charges.

(d) Each Unit is subject to a lien in favor of the Association for the unpaid Common Expenses, Limited Common Expenses, Service Charges and penalties, fines, interest and costs of collection including reasonable attorneys' fees, all as provided in the Condominium Act, the Declaration and the Bylaws.

(e) In any event no later than 60 days after the first Unit is conveyed, all Unit owners including the Declarant shall commence paying monthly common charges to the Association for all Units which have been legally created and submitted to the Condominium.

§7.3 Service Charges. The Association shall have the express power to separately assess a Unit and the owner thereof for a "Service Charge" for services rendered to that Unit. Such Service Charge assessments shall constitute a lien on the Unit with the same status as a lien for Common Expense liability assessments under the Condominium Act, this Declaration and Bylaws, which lien for service charges may be foreclosed in like manner as a mortgage on real estate. The recordation of this Declaration constitutes record notice of the lien. Service Charges shall include without limitation:

(i) If a Unit Owner, members of his family, guests or tenants requests the Association or its agent to perform repair and maintenance work on his Unit, or damages the Common

Elements or safety systems or fails to perform maintenance and repair work required, the expense thereof as determined by the Board of Directors or its designee may be assessed as a Service Charge.

(ii) Fees, if any, which may be established by the Board of Directors for the use and maintenance of water, sewer and/or other utility services and equipment, if not separately metered and billed by the public utility supplier, may be measured separately by such methods and systems established by the Board of Directors in their discretion. The expense of any public utility charges for water and sewer services and of associated equipment maintenance and repair and reasonable reserve allowances, if not separately metered and billed by the public utility supplier, may also be calculated by the Board of Directors in their discretion and assessed monthly as a service charge to each Unit. For budgeting and working capital purposes, the Board of Directors may charge Unit Owners monthly in advance for such expenses based on its reasonable estimate thereof, subject, however, to such periodic reconciliation as the Board in its discretion may deem appropriate based on the measuring system adopted by the Board. At the election of the Board of Directors, the expense of capital improvements, major repairs or renovations to the water and sewer supply systems may be assessed either as a common expense or as a service charge. The expense of water and sewer services for the Common Elements may be assessed as a common expense or as a service charge at the election of the Board of Directors.

(iii) Insurance premiums for permanent improvements to Units installed by Unit Owners and insured by the request of the Unit Owner with the Association's hazard insurance carrier.

§7.4 Payment of and Lien for Assessments, Service Charges, Fines, Etc.

a) Each Unit Owner shall pay to the Association or its designee the following amounts: (i) on the first day of each month or on such other date that the Board of Directors may determine, one-twelfth (1/12th) of the common charges for Common Expenses including Limited Common Expenses, and Service Charges and revised Common Expenses including revised Limited Common Expenses, assessed against his Unit; (ii) all special assessments and any other sums duly levied against the Unit pursuant to this Declaration, the Bylaws, the Rules and Regulations or the Condominium Act which are assessed against Unit Owners; and (iii) interest at the rate of 18% per annum, (iv) fines, penalties, fees, and late charges as may be established by the Board of Directors pursuant to the Rules and Regulations, and (v) legal fees and other costs of collection, foreclosure and enforcement thereof.

If for any reason the Association shall revise its annual budget and as a result the Common Expenses or Limited Common Expenses are increased, then commencing on the next day assessments are due each Unit Owner shall pay to the Association or its authorized representative such revised annual Common Expenses, including Limited Common Expenses, assessed against his Unit.

(b) The total annual assessment levied against each Unit for Common Expenses, Limited Common Expenses, Service Charges, any special assessment, other sums duly levied against the Unit pursuant to this Declaration, the Bylaws, the Rules and Regulations, or the Act, all interest and late charges, all legal fees and other costs of collection thereof, and all fines, penalties and fees as provided in this Declaration or the Bylaws: (i) shall constitute the personal liability of the

Owner of the Unit so assessed; and (ii) shall, until fully paid, constitute a lien against the Unit in favor of the Association as provided in Section 1603-116 of the Condominium Act.

Such lien is prior to all other liens and encumbrances on a Unit except (a) liens and encumbrances recorded before the recordation of this Declaration, (b) a first priority mortgage recorded before or after the date on which the assessment sought to be enforced becomes delinquent, and (c) statutory liens for real estate taxes and other governmental assessments or charges against the Units; provided, however, that such lien is not subject to the provisions of 14 M.R.S.A. Section 4651 and 18-A M.R.S.A. Section 2-201, et seq., as they or their equivalents may be amended or modified from time to time.

If any assessment is payable in installments, upon a default by such Unit Owner in the timely payment of any two (2) installments in any fiscal year, the maturity of the remaining total of the unpaid installments may be accelerated at the option of the Board of Directors, and the entire balance of the assessment may be declared due and payable in full.

(c) The lien for assessments described in subparagraph (b) may be enforced and foreclosed by the Association in like manner as a mortgage on real estate as provided in the Condominium Act, or by any other means presently or hereafter provided by law or in equity. A suit to recover a money judgment for unpaid assessments, interest, fines, penalties, and costs of collection may be maintained against the Unit Owner personally without foreclosing or waiving the lien securing such assessments, and a foreclosure may be maintained notwithstanding the pendency of any suit to recover a money judgment.

(d) Upon a default in the payment of any amount due the Association or a violation of any provision of the Condominium Act, this Declaration, the Bylaws, or the Rules and Regulations of the Association, which violation continues after reasonable notice from the Association to the Unit Owner, then that Unit and its occupants may be excluded from the use and enjoyment of any and all of the Common Elements not essential to access to the Unit, in addition to all other remedies available to the Board of Directors.

§7.5 **Liability.** Multiple owners of a Unit shall each be jointly and severally liable for all Common Expenses, Limited Common Expenses, special assessments, Service Charges, interest, fees, penalties and costs of collection. A grantee receiving a conveyance of a Unit shall not be prevented from exercising any right to recover from the grantor such amounts paid for those assessments, common charges, etc. arising prior to the conveyance. A grantee or proposed purchaser for a Unit under a purchase and sale contract may obtain a statement from the Association setting forth the amount of unpaid common charges, assessments and service charges, late fees, interest and costs of collection against the Unit and such other items required by the Condominium Act, upon payment of such fee as may be established from time to time by the Board of Directors,. The grantee shall not be liable for, and the Unit conveyed shall not be subject to a lien for any unpaid amounts due from the grantor before the statement date in excess of the amount set forth in the statement except interest, late fees and costs of collection accruing thereafter.

§7.6 **Budget.** The proposed budget adopted by the Association's Board of Directors shall be adopted unless rejected by a two-thirds (2/3) vote of all Unit Owners.

§7.7 **Working Capital Fund.** Each purchaser of a Unit shall contribute to a fund for the Association equal to two months common charges per Unit, to be paid by each Unit purchaser at the time of initial transfer of title from the Declarant to each Unit purchaser, which shall be paid to the Association, and used for such purposes as the Board of Directors may approve, including working capital, funding reserves and to cover operating deficits. Such fund shall be held in a segregated account, owned by and in the name of the Association, established at a Maine financial institution insured by the Federal Deposit Insurance Corporation or other equivalent federally sponsored insurance. No purchaser shall be entitled to a refund of such monies from the Association upon any subsequent transfer of a Unit.

ARTICLE 8
MAINTENANCE AND USE

§8.1 **General Maintenance Responsibilities.** The Units and Common Elements shall be generally maintained and repaired by each Unit Owner and the Association in accordance with the provisions of Section 1602-107(a) of the Condominium Act.

§8.2 **Maintenance of Common Elements.** Generally the Association shall be responsible for the maintenance, repair and replacement of the Common Elements, including but not limited to the sewage pump station and system (which shall be maintained and repaired in good condition in accordance with the manufacturer's recommendations), storm water system, snowplowing, street lighting and trash pickup (unless provided by the municipality), all as determined by the Board of Directors. If such repair or replacement of the Common Elements shall be necessitated by the negligence, neglect or misconduct of fewer than all of the Unit Owners, such cost shall be assessed to the Unit Owners responsible as a Service Charge.

Without limiting the foregoing obligations the Association shall be responsible for the following maintenance in accordance with the requirements of the Maine Department of Environmental Protection:

(i) the Association shall be responsible for the maintenance of all storm water management structures, the establishment of any contract services required, and the keeping of records and maintenance logbook. Records of all inspections and maintenance work accomplished must be kept on file and retained for a minimum 5-year time span. The maintenance logbook shall be made available to the DEP upon request.

(ii) Paved surfaces shall be swept or vacuumed at least twice annually in the spring to remove all winter sand, and periodically during the year on an as-needed basis to minimize transportation of sediment during rainfall events.

(iii) Catch basins sumps shall be inspected in the spring and periodically during the year on an as-needed basis. If the catch basin sump is filled, sediment shall be removed via a vacuum truck or any mechanical means, with care taken not flush the sediments into the under drain soil filters or retention systems as it will reduce the system's capacity and hasten the time when it must be cleaned.

(iv) If sediment in culverts or piped drainage systems exceeds 20% of the diameter of the pipe, it should be removed. This may be accomplished by hydraulic flushing or any mechanical means. All pipes should be inspected on an annual basis.

(v) The underground detention system shall be inspected annually, with the initial inspection occurring 6 months after installation. If sediment is found during the visual inspection, a stadia rod should be inserted to determine the depth of sediment. If the depth of sediment exceeds 3 inches, the system should be cleaned using a vacuum process.

(vi) Storm filters will be inspected after every major storm event and at least once every six months. Any trash or debris should be removed during the inspection. If the filter cartridges become clogged, they should be removed and replaced with clean cartridge units. Sedimentation should be removed from the vault via a vacuum processes.

§8.3 Maintenance of Limited Common Elements. Generally the Association shall maintain, repair and replace the Limited Common Elements, all as determined by the Board of Directors.

The Association may assess the costs of maintenance, repair and replacement of the Limited Common Expenses applicable to particular Unit(s) to such Unit(s) if the item giving rise to the expense shall be uniquely for the benefit of such Unit(s), as may be determined from time to time by the Board of Directors. If such repair or replacement of the Limited Common Elements shall be necessitated by the negligence, neglect or misconduct of fewer than all of the Unit Owners, in which case such cost shall be assessed to the Unit Owners responsible as a Service Charge.

Provided however that each Unit Owner shall be responsible for the cleaning of the interior and exterior glass surfaces of door and window, for the operation and maintenance of window and door locks, and removal snow and ice from the porch and deck Limited Common Elements appurtenant to the Unit, and maintain the sewer line leading from the Unit to the point where it connects to the common line, but the Association may elect to provide such services and assess the Units therefore as a Service Charge or as a part of the general Common Charges.

§8.4 Maintenance of Unit/Repair Responsibility. Each Unit Owner shall keep and maintain her or his Unit and its equipment, appliances and appurtenances in good order, condition and repair and in a clean and sanitary condition, whether such maintenance and repair shall be structural or non-structural. Each Unit Owner shall do all redecorating, painting and varnishing of the Unit interior which at any time may be necessary to maintain the good appearance and condition of such Unit. The Unit Owner shall clean the interior and exterior surface of windows in the Unit, including periodic washing.

No Unit Owner shall deposit any trash, dirt, debris or other substance from the Unit onto the Common Elements or Limited Common Elements, except in designated trash disposal areas.

Only ordinary household waste in normal quantities shall be deposited into the sewage system. No person shall pour any grease or non-household chemical into the sewage system.

The Board of Directors may adopt Rules and Regulations requiring the Unit Owners periodically to replace water heaters and washing machine hoses.

Each Unit Owner shall be responsible for all damage to any other Units or to the Common Elements resulting from his failure or negligence to make any of the repairs required by this Article. Each Unit Owner shall perform his responsibilities in such manner as shall not unreasonably disturb or interfere with the other Unit Owners. Each Unit Owner shall promptly report to the Board of Directors or the managing agent any defect or need for repairs for which the Association is responsible.

To the extent that any damage to a Unit is covered by the Association's insurance, the Unit Owner shall be responsible for (i) payment of the first $1,000 of the insurance deductible, if any (or such other amount established by the Rules and Regulations) and for (ii) uninsured damage to any Common Element for which the Unit Owner is otherwise responsible due to the fault or negligence of the Owner.

§8.5 Liability of Owner. Each Unit Owner shall be liable, and the Association shall have a lien against his Unit for, all costs of maintaining, repairing or replacing any portion of another Unit or of the Common Elements including Limited Common Elements to the extent that such costs are caused by or attributable to such Unit Owner's wrongful or negligent act, neglect, omission or carelessness or by that of such Unit Owner's guests, employees, agents, lessees, invitees, or their pets. The Association shall have the right to repair any damage so caused, to cure or correct the cause of the damage and to maintain or replace such damaged Unit or Common Element to the extent the Association deems necessary and appropriate. Such liability shall include any increase in insurance rates occasioned by uses, misuse, occupancy, or abandonment of any Unit or its appurtenances. Nothing herein contained, however, shall be construed to modify any waiver by insurance companies of rights of subrogation against such Unit Owner.

§8.6 Use and Occupancy Restrictions on Units. Each Unit shall be occupied and used subject to the following restrictions:

(a) *Single Family Residential Use.* No Unit shall be used or occupied for any purpose other than for single family residential purposes, provided, however, that an occupant of a Unit may conduct business activities within the confines of such Unit so long as no signs are displayed, the Unit is not used for meeting with customers or third parties, and there is no noticeable increase in deliveries. Provided however that nothing in this Declaration or the Bylaws shall be construed to prohibit the Declarant from exercising any easements and Special Declarant Rights reserved by the Declarant, including without limitation promotional, marketing or display purposes, sales of Units and for customer service purposes, or from leasing Units owned by Declarant as provided in this Declaration.

(b) *Insurance.* No activities shall be carried on or materials used or kept in any Unit or any in the Common Elements that will increase the rate of insurance for the Property, or any part thereof, without the prior written consent of the Board of Directors. No Unit Owner shall permit anything to be done or kept in his Unit or in the Common Elements which will result in the cancellation of insurance on the property, or any part thereof, or which would be in violation

of any law, regulation or administrative ruling. No waste may be committed on or to the Common Elements.

(c) *Nuisance/Hazard.* No Unit shall be used so as to create a nuisance or an unreasonable interference with the peaceful possession or proper use of any other Unit or the Common Elements.

No owner or occupant of any Unit shall carry on, or permit to be carried on, any practice which unreasonably interferes with the quiet enjoyment and proper use of another Unit or the Common Elements by the Owner or occupant of any other Unit, or which creates or results in a hazard on the Property.

(d) *Pets and Animals.* The Association shall have the power to restrict and regulate pets and animals under the Bylaws or the Rules and Regulations of the Association as promulgated or amended from time to time. Upon notice and opportunity to be heard, the Board of Directors may expel any offending pets and animals from the Property.

(g) *Fire Safety and Noise Control.* No person shall impair nor remove the any acoustical, sound-deadening, or fire-resistant material from the walls, floors or ceilings of a Unit without replacing the same with materials of equal or greater such qualities.

(g) *Trash.* Trash, garbage and other waste shall be kept only in sanitary containers and shall be disposed of in such manner as may be prescribed in Rules and Regulations established by the Board of Directors. No articles of personal property belonging to any Unit Owner shall be stored in any portion of the Common Elements.

(h) *Electrical.* No Unit Owner shall overload the electrical wiring in the Condominium. No Unit Owner shall operate any machinery, appliances, accessories or equipment in such a manner as to cause, in the judgment of the Board of Directors, as appropriate, an unreasonable disturbance or make any alterations, repairs or modifications to or connection with the electrical or plumbing systems without the prior written consent of the Board of Directors, as appropriate.

Additional major appliances may not be installed in a Unit without the prior written consent of the Board of Directors.

(i) *Governmental Requirements.* All Unit Owners, Unit Occupants, their families, guests, invitees shall comply with and conform to all applicable laws and regulations of the State of Maine, and all ordinances, rules and regulations of the Town of Windham. An Unit Owner shall hold the Association and other Unit Owners harmless from all fines, penalties, costs and prosecutions for the violation thereof or noncompliance therewith.

(j) The Association's sewage system shall be used only for ordinary household purposes.

§8.7 **Use of Common Elements**. Subject to this Declaration, the Bylaws or by the Rules and Regulations adopted from time to time by the Board of Directors pursuant to its powers, each Unit Owner, occupant, tenant, guest, visitor and invitee may use the Common Elements in common with all other Unit Owners and their occupants, tenants, guests, visitors and invitees, in accordance with the single family residential purposes for which they are

intended, without hindering or encroaching upon the lawful rights of the other Unit Owners, upon the following terms:

(a) *Motor Vehicles and Parking.* Only passenger vehicles and trucks with a gross vehicle weight of less than 8,000 pounds may be kept or stored on the Property, and such vehicles must be in operable condition and fully licensed for operation on public highways.

No inoperable vehicles, nor any boats, recreational vehicles, snowmobiles, terrain vehicles or other vehicles or recreational equipment, trailers, or similar items may be kept or parked on the Property except within the garage forming a part of the Unit or as otherwise permitted by the Rules and Regulations. No snowmobiles, all terrain vehicles or similar items may be operated on the Property except in compliance with the Rules and Regulations.

Motor vehicles may be parked only in the garage and in the driveway adjacent to each Unit designated as a Limited Common Elements and in those portions of the Common Elements designated from time to time by the Board of Directors for parking. No parking shall be permitted areas posted against parking by the Board of Directors, and no overnight parking shall be permitted in the common street. Other than the driveway Limited Common Element appurtenant to each Unit or as the Board of Directors may permit from time to time, any Common Elements designated as spaces for parking shall be used by the Unit Owners on "first come, first served" basis. No unattended vehicle shall be left in such a manner as to impede the passage of traffic or to impair access to driveway or parking areas.

The Board of Directors may adopt such Rules and Regulations as it deems necessary or appropriate to further regulate parking and the use and storage of motor vehicles generally.

(b) *Exterior Alterations.* Except with the written consent of the Board of Directors or as otherwise expressly provided in this Declaration, no person shall (i) construct or maintain any antennas, dishes, wires, cables, fences, decks, steps, signs, canopies, clotheslines or other structures, nor (ii) plant, trim, cut or remove vegetation, trees or shrubs, nor (iii) materially alter the grading or landscaping, nor (iv) do any other thing which affects the appearance from the exterior of the Common Elements or Limited Common Elements.

The Board of Directors may its discretion designate areas in which Unit Owners may plant flowers and annuals based on plans specifically approved by the Board and subject to the obligation of the Unit Owner to maintain such items in good condition and repair, failing which they may be removed by the Association at the Unit Owner's expense.

(c) *Signs.* No signs of any character shall be erected, posted or displayed from any Unit, Common Element or Limited Common Element without the prior written approval of the Board of Directors, except for such signs as may be posted by the Declarant for the promotional or marketing purposes as permitted herein or as permitted by the Condominium Documents. The Board of Directors may also erect or authorize directional and identifying sign(s) listing the name and location of each occupant of the Units.

(d) *Obstruction/Storage.* No Unit Owner shall obstruct any of the Common Elements nor shall any Unit Owner place or store anything on any of the Common Elements except those

areas designated for parking by the Condominium Documents or as permitted by the Board of Directors pursuant to the Rules and Regulations.

(e) *Responsibility.* Neither the Board of Directors, the Association, any Unit Owner, nor the Declarant shall be considered a bailee of any personal property stored on the Common Elements (including vehicles parked on the Common Elements), whether or not exclusive possession of the particular area is given to a Unit Owner for storage or parking purposes. None of them shall be responsible for the security of such personal property or for any loss or damage thereto, whether or not due to negligence, except to the extent covered by insurance in excess of any applicable deductible.

§8.8 **Leasing.** A. No portion of any Unit (other than the entire Unit) shall be leased for any period. No Unit owner shall rent or lease a Unit other than in accordance with a written form of lease for a period of not less than six (6) months which contains the following provisions:

(i) The tenant and all other occupants must comply with the Declaration, these Bylaws, and Rules and Regulations;

(ii) The tenant failure to comply constitutes a default under the lease;

(iii) The Board of Directors has the power to terminate the lease or to bring summary proceedings to evict the tenant in the name of the Unit owner after Thirty (30) days' prior written notice to the Unit owner, in the event of a default by the lessee in the performance of the lease, and

(iv) In the event that the payment of Common Charges and/or Service Charges or other amounts due to the Association becomes more than 30 days past due, the Association may require the Tenant to pay directly to the Association the rent on the Unit in an amount of up to the balance of current and delinquent Common Charges and other unpaid amounts outstanding, subject to the rights of any recorded first mortgage or Eligible Mortgage Holder which has exercised an assignment of rents. The Association's notice to the Tenant shall be conclusive and binding on the Tenant as to the Tenant's obligation to pay the rent directly to the Association and as to the amount of Common Charges and other fees due. The Unit owner shall have ten days after such notice is sent to file any objection with the Board of Directors, which objection must be in writing and signed under oath under the pains and penalties of perjury, must contain a short and plain statement of any alleged errors by the Association, and shall include copies of cancelled checks or other written evidence of objection or miscalculation of the amounts due. The Unit owner must state what amounts, if any, which the owner admits is owed to the Association.

Every lease or tenancy shall be in writing. The foregoing provisions shall be deemed to be automatically incorporated into any lease and into the terms of any tenancy or other agreement for the occupancy of a Unit.

Each Unit owner of a Unit shall, promptly following the execution of any written lease of a Unit, forward a true copy thereof to the Board of Directors.

The foregoing provisions of this paragraph shall not apply to an institutional lender in possession of a Unit as a result of foreclosure, judicial sale or a proceeding in lieu of foreclosure.

B. In the event a guest or tenant of a Unit fails to comply with the provisions of this Declaration, the Bylaws, Rules and Regulations or the lease, then, in addition to all other remedies which it may have, the Association may notify the Owner of such violation(s) and demand that the same be remedied through the Owner's efforts within a reasonable time after such notice in the judgment of the Directors.

If such violation(s) is(are) not remedied within said period, then the Owner shall thereafter, at his own cost and expense, immediately institute and diligently evict his tenant or guest on account of such violation(s). In the event the Owner fails to so act promptly, then the Board shall have the right, but not the duty, to institute and prosecute such election as attorney-in-fact for the Owners and at the Owner's sole cost and expense, including all legal fees incurred. Said costs and expenses shall be due and payable upon demand by the Association and shall be deemed to constitute a lien on the particular Unit involved, and collection thereof may be enforced by the Board of Directors in the same manner as the Board is entitled to enforce collection of Service Charges and common charge assessments.

The Declarant shall have the right to operate any Units (even if not then created as Units) owned by the Declarant as a rental property, and may establish and maintain offices, signs and other accouterments normally used in the operation of rental properties in the Declarant's discretion. Such rental operations shall be for the benefit of the Declarant; neither the Association nor any Unit Owner shall have any interest or right in the profits and losses from such operations.

Section 8.9 Liability for Assessments, Etc. In the transfer of a Unit, the grantee of the Unit shall be jointly and severally liable with the grantor for all unpaid Common Charges, assessments and Service Charges, penalties, fees, interest and costs of collection outstanding at the time of the grantor's transfer, without prejudice to the grantee's right to recover from the grantor the amounts paid by the grantee therefore. However, any such grantee or proposed purchaser under a purchase and sale contract upon written request and upon payment of such fee as may be set by the Directors may obtain a statement from the Board of Directors setting forth the amount of unpaid, assessments, and Service Charges against the Unit, and the grantee shall not be liable for, nor shall the Unit conveyed be subject to a lien for any, assessments, and Service Charges arising before the statement date in excess of the amount therein set forth.

Section 8.10 Common Elements. No Unit owner shall execute any deed, mortgage, or other instrument conveying or mortgaging title to his Unit without including therein the interests in Common Elements appurtenant thereto, it being the intention hereof to prevent any severance of such combined ownership. Any such deed, mortgage or other instrument purporting to affect one or more of such interests, without including all such interests, shall be deemed and taken to include the interest or interest so omitted, even though the latter shall not be expressly mentioned or described therein.